Telephony.

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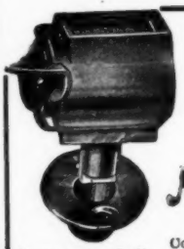

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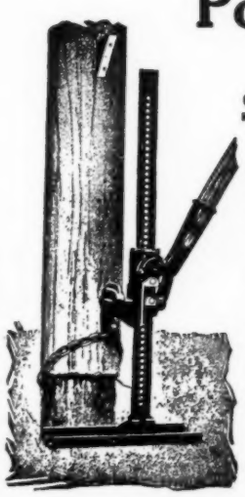

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THE MUNICIPAL TELEPHONE THREAT; BUSINESS OUTLOOK GOOD

Telephone men in Nebraska are reported to be somewhat disturbed because several towns in the state are talking of establishing municipal telephone systems. Kickers against Northwestern Bell service rates are agitating the question, and, according to the news reports, at Holdrege and McCook are canvassing the citizens for the proposition.

When a man imagines he has a grievance, it is human nature to flare up and declare he is going to put the other fellow out of business. Nine times out of ten a little reflection shows that is a mistake, and a fair investigation often proves that there was not so much to kick about after all.

It's an easy thing to get signatures on most any kind of a petition, especially if it aims to make trouble for a utility company, but if the citizens of Nebraska who are being canvassed for a municipal telephone system "look before they leap," they will be a little slow about jumping into the project.

* * * *

For the value given, telephone service is the cheapest commodity the American public is buying today. State commissions exist for the express purpose of seeing that service rates are fair and reasonable and that service is satisfactory, and fair-minded, intelligent business men agree that they are doing the job well. One thing that can be truthfully said is that the commissions are not favoring service companies unduly. They are endeavoring to keep the boat on an even keel.

It is significant that the Nebraska commission and most of the press of the state do not regard favorably the municipal telephone idea. Moreover, business men object to already high taxes being increased for the establishment of a municipal plant, and also by the loss of taxes now being paid by the privately-owned companies.

* * * *

A forceful argument against the municipal telephone project is found in the weekly bulletin issued by the Nebraska Utilities Information Bureau, which contains this paragraph:

"Arthur C. Townley, former head of the Non-Partisan League, is the man who, more than any other, was responsible for North Dakota's ventures in state ownership. Under his guidance the state built wheat elevators, started newspapers, formed a home-building association, wrote hail insurance, operated a creamery, ran stores and went into the banking business. All failed, although the bonded indebtedness of North Dakota increased $17,000,000, and taxes rose 400 per cent.

For some time after the fall of his house of cards, Townley insisted that his plans were sound, but now, after he has had time to think the matter over, he says:

'I am convinced that there are forces in the economic system more powerful than the government, which makes it impossible for state enterprises to succeed. My motto is "Each man to his trade."'

The trade of government is government, not business. Take it from Townley. He has had more experience with government-operated business than any other man."

Townley's motto, "Each man to his trade," is a sensible one, and in line with the statement made recently before the convention of the Independent Telephone Association of Washington, to the effect that the time is approaching when the farmers will get out of the telephone business and leave it to those who are qualified to handle it more efficiently. The politicians who would run the municipal telephones would have even less success than the farmers in giving the public satisfactory service.

* * * *

There is usually more or less bungling connected with man-controlled affairs, but old Mother Nature moves serenely along without making many mistakes. Some business observers are now worrying over the outlook for a big coal strike in the fall. For instance, if you need cheering up, consider these reports from the corn fields of Iowa:

A correspondent at Perry, in Dallas county, says that the corn is so tall in that neighborhood that the farmers have had to erect signboards to warn automobile tourists of the cross-roads that are hidden by the gigantic green stalks.

Just west of Perry, in the adjoining county of Guthrie, is the small town of Jamaica, which claims only 300 population, but it is in the heart of the corn belt and doesn't take a back seat for anybody when crops are mentioned.

The Jamaica Mutual Telephone Co. operates in that district, and its members are willing to make affidavit to the statement that the corn stands so high in the fields surrounding the village that the water tower and the dome of the new schoolhouse cannot be seen from the approaching roads.

As an encouraging business sign, these Iowa corn reports beat all the Babson charts and Moody forecasts ever given out, good as they are.

* * * *

A big corn crop means good times on the farm, and will help business generally; In fact, the first half of the year—ending June 30—shows that the country is comfortably prosperous, and the outlook is quite encouraging for the coming months.

According to the statisticians, total business operations for the half year compare favorably with the first half of any previous year, with gains and losses in the various branches of industry offsetting each other so well that transactions for the period are a trifle above 1924.

The national debt has been reduced 12 per cent in the last year, while there have been gains in bank deposits, exports, car loadings and corporate financing. If Congress makes a further material cut in federal taxes, as it undoubtedly will, business conditions will improve still more.

COMING CONVENTIONS.

New Hampshire, Keyser Lake, North Sutton, Huntoon House, September 17 and 18.

Indiana, Indianapolis, Claypool Hotel, September 23 and 24.

United States Independent Telephone Association, Chicago, Sherman Hotel, October 13-16.

Telephone Economics Analysis

Some Notes on Analysis of Results Treated from the Broad Standpoint of Ultimate Results, and on the Executive Coordination of Functional Detail Results—One of a Series of Articles on Telephone Management

By T. H. Nicholson

One of the finest news features ever secured by the technical press is the story of the development of special rate business in the telegraph field, and in this story is established a fundamental law that is one of the main pillars in economics.

The story goes that during Walter S. Gifford's association with the late Theodore N. Vail, he was called up one morning before breakfast by Mr. Vail, who said: "I want a report on the use of the telegraph. Let me have it as soon as you can."

As the telephone company, at that time, had acquired control of the Western Union Telegraph Co. also, Mr. Vail's interest in the subject was perfectly natural. But, even though Gifford was accustomed to laconic messages from his chief, he was puzzled. Just what did Mr. Vail mean by "the use of the telegraph"?

Gifford wondered—but he didn't ask Vail. He knew it was up to him to get along without any further explanation.

He decided to collect facts which he considered the most important ones. So he set his staff to work to determine how many messages were handled daily by the company's wires. Then he calculated the number that *could* be sent over those wires.

The following morning, when he submitted his report, it was received with an incredulous shake of the head. Mr. Vail said there must be some mistake in it. He couldn't believe that the messages carried by the wires were so far short of the number that *could* be carried.

Gifford was so taken aback that he picked up his papers and returned to his office. There he carefully checked up the facts and decided that he was right. Summoning all his courage, he again went to see Mr. Vail; and this time he convinced his chief that something should be done to increase telegraph traffic during the hours when the wires were practically idle.

Mr. Vail, in his turn, quickly found a solution of the problem. He introduced the now familiar "night letter" for transmission at reduced rates during the night. It was followed by the "day letter," for transmission during the slack period of the day. Thus was inaugurated a service which has become as important to the public as it is financially beneficial to the company.

The law disclosed and applied in this story is *that until every unit of a facility is profitably used, there is an economic loss.*

There is nothing mysterious in the application or working out of this law; in fact, like all true fundamentals, it is almost as simple as adding two and two. Perhaps it is its very simplicity that obscures it, while those laws and formulæ that require a slide-rule are better known because of their complexity.

Let us take, for a working example, the problem of ultimate results of a toll plant, which is identical with the problem in which this law found fame. We are all accustomed to seeing alleged results charted in the form of "busy-hour talking-time efficiency," "use of toll lines," "calls per line in busy hour," "net return on investment," etc., but a comparative picture of *possible* and *actual* results on a toll group is a rare thing.

The executive is not immediately concerned with any of these apparent results; he knows that the investment is there, and that the fixed charges are continuous, whether the lines are earning money or not; he knows that time is an exact measure of this fixed cost element, and that a theoretical loss occurs with every minute not recorded as paid-time.

The fact that circuit time is consumed by operators in completing connections is to him only a necessary evil that must be eradicated if possible. He also appreciates that business and social customs tend to give irregular circuit loads with very wide variations in the course of any given period, but that is only an example of cause and effect which must be balanced.

The outstanding fact to him is that the circuits are available 525,600 minutes per year, as far as he is concerned. Every minute short of this in the paid-time records show a theoretical loss, and the problem is not solved until all these minutes are profitably used.

The preparation of these results is usually as simple as the law governing them. In the problem we are using for an example, it is an easy matter to tabulate the calculagraph time concurrently with other statistical or accounting processes and with very little added effort, giving a series of totals that can form the basis of a set-up in any desired terms of *actual use*. The *possible use* totals are, of course, simply the product of the number of circuits involved, and period-minutes.

The method of portraying this results set-up is largely a matter of individual preference, but a graph of some sort is probably the most useful, in that the

facts can be made to stand out without any effort being expended; also successive results can be more easily compared without the preparation of summaries.

In Fig. 1 is shown a form of chart on which group graphs of this character can be easily plotted and analyzed. In addition, the same form can be used for any one of the several groups, or for district, division or all-company purposes.

The chart and the method of using it is very simple: It is divided horizontally in terms of circuits, and vertically in hours, with divided columns under each hour-space for supporting data. A line is drawn across the chart at the proper point to show the circuit-hour capacity or *possible use* of the group under study, and then an area equal to the circuit-minutes, as shown by the calculagraph records, plotted and shaded for each hour, thus indicating the *actual use*.

Obviously the unshaded area below the "capacity" line is wasted and shows an economic loss that cannot be disputed or denied. Although the necessity for some of this apparent loss may be justified, and other portions of it found, in the last analysis, to be impossible to use, the point is that until this blank area is entirely shaded, the efforts to improve along several possible lines cannot be discontinued.

A secondary survey, through the use of functional charts or tables, can be made to show the portions of this blank area that are chargeable to each of the several functions. These measures can be superimposed on the same chart and thus a fairly complete picture of the entire operation obtained, enabling intensive efforts to be directed at what appear to be the weakest or most wasteful points.

This can be delineated in a broad way under the headings of plant, traffic and commercial; including under plant such items as out-of-order time, wire chief's circuit-testing time, routine test time, etc. Under traffic can be included holding time, slow-answer time, switching time, and such other items as are found to occur. The balance of the total circuit time not accounted for above and by the actual used time must be charged to commercial.

Probably under average conditions it will be found that the commercial debit is the most promising one to follow up, in that comparatively large areas will appear under that heading, and which will be out of all proportion to the average hourly loss, while the traffic area will usually correspond fairly closely to the used-time area. The plant proportion is the least under control, in that trouble is not so much a measure of, or by, use, but largely of accident, with the exception that inside troubles are more likely to occur during the busy hours than at other times.

It is not within the scope of these notes to discuss the detail ways and means for the reduction of this waste time by the various functions, but it is not out of place to consider some of the features in connection with the efforts to bring about this reduction.

In the case of commercial efforts a very wide latitude is permissible in the means to be taken, and without danger of any serious reactions, although this point should, of course, be carefully considered. For example: if a limited-hour sequence-service is offered to a selected group of patrons, care must be taken to avoid overcrowding other toll groups over which some of this service might be routed. Possibly also a seasonal peak not realized for the moment may occur during what appear to be low-load hours, and if special services sufficient to fill up the waste spaces are secured, then a mad congestion with the inevitable reactions will be engo in preventive work, because, as in the case of actual trouble work, there is no use in trying to prevent something that is less costly to remedy than it is to prevent. The traffic function, however, is one in which the effect of methods on results is the most marked, and in which one of the secondary rules of the fundamental law can be most easily broken, and consequently the law itself wrongly applied.

In other words, it must be remembered that each unit of circuit-time must be *profitably* used, not merely *used*. For example, if it is found that to carry the offered business during a given peak hour, methods have to be used that, say, double the operating cost, then the circuit-time during that peak hour is not profitably used as compared with other periods.

Just how such difficulties can be over-

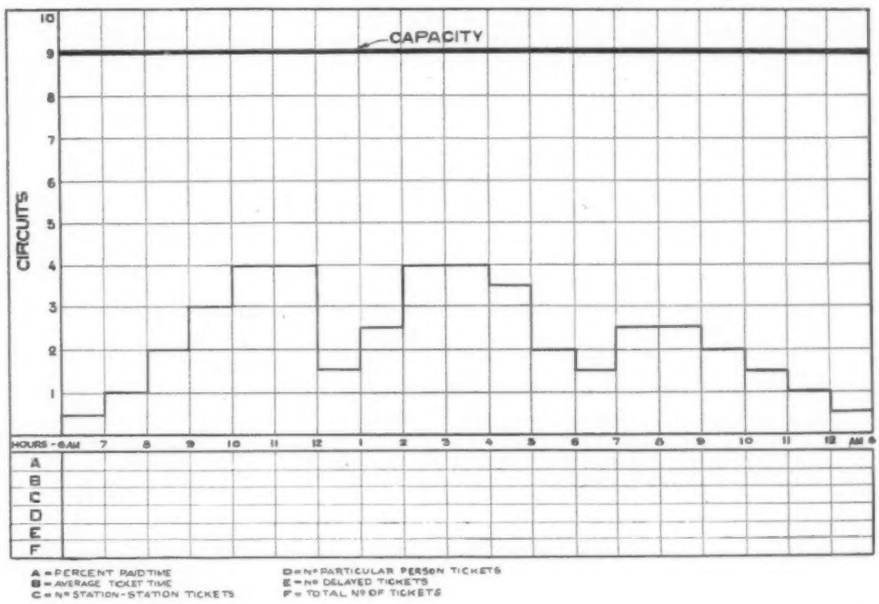


Fig. 1. Chart for Plotting and Analyzing Actual Used Time of Circuits as Compared with Their Possible Use.

countered when this seasonal load occurs.

For commercial purposes it is undoubtedly advisable to make a rough check on past records and from these to make up a long-period results chart to show if any such seasonal irregularities exist, or possibly other controlling conditions.

In plant matters the analysis should tend towards finding methods of restoring service on interrupted lines or equipment in the shortest possible time, with the qualification that the high-speed methods should only be used during peak-load hours, for obviously nothing is gained by clearing a line in a ten-circuit group if at the moment there is only a three-circuit load.

This analysis should also include a determination of how far it is profitable to come, whether by commercial efforts to level the load, or by a longer delay factor, is a matter for individual determination, but the fact that such a condition may occur must be considered.

It should be clear from even this brief consideration that this, like many other problems, is a whole-company proposition, and is impossible of solution unless all the factors entering into it are properly coordinated; which coordination is nothing more or less than the executive interpretation and application of the fundamental economic law.

As a compass for directing the course of all functions in this particular problem, copies of the executive "ultimate results" chart, with the secondary delineation of functional debits, should serve a useful purpose not only in keeping the functions in touch with the overall measure of their respective weakness or strength, but also in giving them an image of the executive's viewpoint of it at all times.

AUTHOR'S NOTE: The *used time* area of the chart shown is purely imaginary and the item details have been left out as they are not illustrative of the example.

The example used in these notes covers only one of the more important problems in the telephone business, but with suitable modification it can be made to apply to any features; and similarly can be extended to cover groups of features to any desired extent.

The use of analysis methods and the formulation of fundamental laws to govern the general economics of *relative use* in telephone facilities is not given sufficient importance. This is not altogether unnatural because in the bulk of telephone business—local traffic—there is very little real incentive to keep the investment working every minute. It is usually a case of providing enough plant and personnel to give the amount and grade of service demanded, with adjustment of rates to give a profitable return on the capital involved.

The average telephone executive would probably frown, and perhaps rightly so, on any proposals to increase the unit load of a local plant, with the exception of measured or pay-station service, because he would feel that the net results would only be added worries with probably no additional net return.

These methods, however, can be applied equally well in efforts to keep down operating costs of local plant, either in the way of increasing personal efficiency, or even, and in spite of possible reluctance to do so, to increase the *used time* of the plant. The results may not be increased returns, but they will certainly be decreased unit costs and thus postpone the necessity for increased basic rates otherwise inevitable in any growing telephone plant.

The underlying thought is purely economic, however, and has nothing to do with policies or desires which must be considered with the economic results found or thought possible.

Independent Pioneer Association Gives Accident Insurance.

The Independent Pioneer Telephone Association of the United States has made arrangements with the Great American Casualty Co., of Chicago, an incorporated accident insurance company, to insure all of its members whose dues are paid in advance, furnishing them free, a very liberal accident policy, giving the members real protection for $1,000 in case of loss of life, limb, eyesight, with an annual increase of $100 a year up to the fifth year.

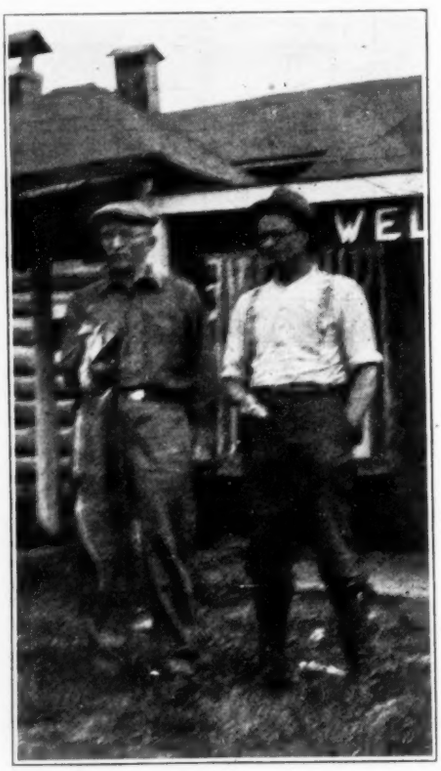
J. K. Johnston, the secretary of the Pioneers, Lemcke building, Indianapolis, Ind., states that to collect under this policy it is not necessary to fall from an elephant or travel the Siberian railway to get in a train wreck. The policy covers injury while driving your own automobile or getting knocked down or injured while crossing the street or highway.

The company will also pay disability indemnity of $10 a week for 90 days, covering certain accidents. In brief, the policy is broader and more liberal than most policies of the group insurance type and should be sufficiently alluring to every one who can qualify for membership in the Pioneers association, the dues of which are but $3 annually.

Want a "Musky"? Send Orders to Firm of Edwards & Schade.

J. B. Edwards, president of the Kellogg Switchboard & Supply Co., and E. D. Schade, general manager of the Johnstown (Pa.) Telephone Co., recently spent several weeks at the summer camp of the Chicago Rod & Gun Club, situated on Gunlock Lake, in northern Wisconsin. Both are directors of the United States Independent Telephone Association, nationally known in the telephone field, and friends of many years standing.

The accompanying illustration is made



E. D. Schade, of Johnstown, Pa., Displaying with Pride a 23-Pound "Tiger Musky."

from a photograph, showing Mr. Schade standing in front of the club's log home, smoking his favorite briar and displaying with evident pride a 23-pound "tiger musky," 41 inches long. The be-spectacled party at Schade's left is one of the guides.

"Where does J. B. Edwards figure in this incident?" some one asks.

Well, the fact is that the records show that "J. B." caught the "musky" and kindly loaned it to his friend Schade so a snapshot could be taken for the benefit of the folks back in Johnstown. This sounds O. K. for "J. B." has the reputation of being one of the most skillful anglers that ever made a cast on a Wisconsin lake. Besides, he is a staunch friend of Ed. Schade.

Both Mr. Edwards and Mr. Schade are now making the Golfers' Magazine trip through the Pacific Northwest and Canada.

Consolidation of Dual Telephone Systems at Seymour, Iowa.

The Seymour Telephone Co., of Seymour, Iowa, was recently purchased at foreclosure sale by the Genoa & Seymour Farmers Mutual Telephone Co. of that city. The former company operates some 200 telephones and the latter about 400 stations in Seymour and the contiguous rural territory.

The sale of the Seymour Telephone Co. marks the end of a 20-year old battle between two companies. At one time a few years ago the directors of the Seymour Telephone Co. offered to sell to the Farmers Mutual, but the price was considered too high and the offer was refused. Since then the Seymour Telephone Co. has been under various managements and had become only trading property with the system in poor condition. The foreclosure of the mortgage by order of the Mahaska County court finally settled the battle.

Extensive Program of Ohio Cities Company; Financing Plans.

An offering of $400,000 first mortgage 6 per cent, convertible gold bonds of the Ohio Cities Telephone Co., of New Philadelphia, Ohio, is shortly to be made by Schultz Brothers & Co., of Cleveland, at par and accrued interest.

The Ohio Cities Telephone Co., formerly the Tuscarawas Telephone Co., has has grown from a system operating 790 stations in 1901 to 4,300 at the present time, with 800 applications for service on its books.

The company is completing the installation of 20 miles of underground cable, and erecting a new exchange. Automatic exchange equipment will be installed in the new building, upon its completion.

Arkansas Association Holds Mid-Summer Meeting.

The mid-summer session of the Arkansas Telephone Association held a two-day meeting in Hot Springs, Ark., last week and selected Little Rock as the place for holding the annual meeting in January.

A. L. Lane of the Southwestern Bell Telephone Co., delivered an address to the convention at a morning session, urging cooperation, and J. E. Armstrong, of Russellville, spoke on the 10 most important things essential to better service.

In the afternoon the convention listened to two addresses, one by Walter Ebel, a local newspaperman, who spoke on the "Relation of the Press to Public Utilities," and Earl W. Hodges, director of the Public Information Bureau of Arkansas Utilities Association, whose subject was "Selling Arkansas."

Safety Methods in Telephone Work

Fifth of a Series of Articles on Safety Methods in Telephone Work—Safety in Operation of Motor Vehicles a Matter of Education—Helpful Competitive Plan of Bell Company—Suggestions for Reducing Accidents to a Minimum

By A. W. Hill

The incessant march of progress during the past decade has, of necessity, forced utility companies to keep abreast with the time and replace the old and slower methods of using horse-drawn vehicles with trucks and lighter automobiles. Telephone lines have gradually worked their way out from the confines of metropolitan areas into the most isolated and distant points.

This, coupled with the fact that the public not only expects but demands a higher and more prompt grade of maintenance than formerly, means that vehicles must be used which will speed up operations. Then, too, operated properly, the automobile is a money-saver for the company operating it.

Just how much saving can be reasonably expected is entirely dependent on two things: First, the kind of machine purchased, in that it be particularly adapted to the use to which it is to be put; and second, the type of person in whose care it is to be placed. Since we are particularly interested in the safety factor, the first need not be given more than passing consideration in this article other than the advisability of getting the best possible machine that will operate safely and economically.

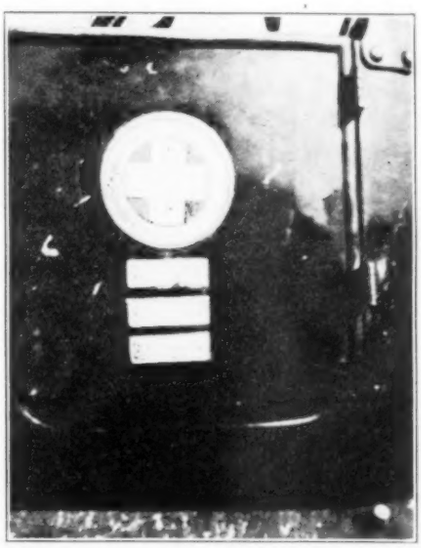
Depending on the size of the operating company and its needs, there are motor vehicles for every purpose, from the roadster without extra equipment or the roadster equipped with cabinet body and ladder irons, to the heavy trucks, for construction crew use, fitted with power winch and derrick and capable of handling practically any heavy construction job that may come up.

There is little to say in regard to the type of operator, except that he be a person of good judgment, able to think quickly, blessed with all his faculties, and possessing a willingness to use and maintain his car in the same condition he would keep any other tool on which depend his life or safety and the lives and safety of others who travel the same highways.

Making it a matter of personal pride is one of the best methods of making and keeping safe drivers. Put a man squarely on his pride in wholesome competition with others, and if he be of the worthwhile type, he will spare no pains to keep pace with the rest.

After all, safety may be summed up as a matter of education pure and simple; the only difficulty being that along with the pure we are unfortunate enough to have a certain percentage of the simple, both figuratively and literally.

The associated Bell companies have in operation a system, more or less competitive in a way, although there are no awards of any kinds given, by which all who care to may read, not only the members of their own organization but the public at large, may learn that a machine has had no accidents over a certain period of time. A vehicle that is driven for one year without accidents of any nature, excepting of course minor breakdowns which incur no real damage, is equipped with a safety seal of enamel metal bearing the words, "Stop Accidents—This Car Had None."



"No Accident" Seal and Year Bars.

Underneath the seal there is placed a small oblong plate of the same material bearing the year. Each year another plate is added so long as there are no accidents. Any accident is the cause of the car being stripped of all insignia. This system gives every driver a measure of pride in keeping his insignia and adding to them. These are placed on the door of the car, or in some other equally conspicuous place on each side, and draw much favorable comment from the public.

Now let us consider just what the driver of a car must do to keep himself and the public as safe as possible. Of course, there are some accidents that seem almost impossible to prevent, but by and all they are very much in the minority. Accidents are sometimes caused by the breakage or failure of vital parts of machinery at a critical time but even a great percentage of these could be avoided by careful inspection and immediate renewal of worn or otherwise defective parts.

Given a well-made piece of machinery and the human element in the form of a driver, and it is a notable fact that the human element fails in its given function oftener than the mechanical one. From this it is evident that the first thing to do to insure safe vehicle operation is to give the machine frequent and rigid inspections to see that there are no badly-worn parts and, if there are such, not to take a chance on getting a little more service out of them. That is a method of false economy commonly practiced which, in the end, is most expensive.

Steering gear, springs, wheels, and brakes should be given most careful attention, for failures in these parts are the most common sources of accidents. Tires that show signs of being badly worn, to the point of blowing out, should also be replaced instead of trying to grind out a few more miles, with the very possible chance of taking a hasty and entirely unexpected excursion through a roadside fence. All parts requiring lubrication should be kept well-oiled or greased to prevent the excessive wear of metal on metal.

Taking a chance on worn brakes is also another cause of a great number of serious accidents. A driver who takes a machine out into traffic, knowing that his brakes are in an unsafe condition, so that the car could not be stopped on an instant's notice, is morally guilty of a criminal act. His proper duty is to have repairs made immediately he discovers their failure, or refuse to use the car until such time as they can be made.

Bad brakes have long been made the excuse for accidents, but too frequently there has been no legitimate reason for bad brakes. There have been cases, no doubt, where brakes have failed utterly without warning, but usually there is ample notice when they begin to wear to have proper repairs made.

Now let us take the car out under the supposition that the driver is fully competent to operate it, has inspected it thoroughly, and everything is in first-class condition. Probably the first hazard he meets on the road is that much reviled—and justly so—pest, the roadhog—the man who takes his half of the road in the middle.

If we desire to play safe, regardless of our private opinion as to his ancestry and

personal character, we must give him more than half of it, if necessary, the major part of the road. Better that than to suffer serious injury or possible death, despite our convictions as to the justice of having to do so.

Trying to outguess the other fellow, or to think for him when in close quarters or at street intersections, is also conducive of accidents. Better to come to a full stop if in doubt as to the course of the other fellow. At least, he will do you less damage if he strikes your car while it is stopped than if you go together in rapid motion. In case of an argument, the car that was under control and stopped has a decided advantage in any resulting damage suit. It is hard to convict on a reckless driving charge if a machine is not in motion.

Pedestrians should be looked after at all times, especially children. Reduced speed and extreme watchfulness and caution should be exercised in passing school houses or along streets where children are passing or are at play. A child's mind is more or less of a single-track affair. We must not forget, when a child takes a notion suddenly that it wants to be on the other side of the street, that, for the moment, is probably the only thought in its mind, and that it is necessary for us to protect them.

Grown persons, too, are prone to forget themselves and walk through traffic or step out from back of parked cars, or other objects that obstruct the view, without looking. Sometimes it is absolutely impossible to avoid striking them or hitting something else in trying to avoid them, but if the car is proceeding cautiously and under full control, there is everything in favor of keeping such accidents at a minimum.

Grade crossings are a necessary evil with which the driver must contend and he should watch carefully. Crossings where there is no watchman or mechanical warning should be approached with extreme caution. If the view is in any manner obstructed, the car should be brought to a complete stop a safe distance from the crossing until absolutely certain that nothing is approaching. With heavy trucks it is good practice, if an unobstructed view cannot be obtained, to send a man ahead to flag. Attempting to shift gears on a railroad crossing is a bad practice which often results in a stalled motor and disastrous effects.

A train, traveling at a speed of 60 miles per hour, is only 15 seconds from a crossing when ¼-mile distant from it, and will require at least ¼-mile in which to stop after the throttle is closed and the brakes applied for an emergency stop. Hence trying to beat a train across is, at the best, extremely hazardous.

The use of chains should be required in all cases of running on wet or icy streets and roads; also avoiding as much as possible the sudden application of brakes when such road conditions exist. Speed is all right on a racetrack, or in a case of life and death, but in the telephone business it is uncalled for and to be condemned.

Child Run Over by Careless Driving.

Following the foregoing suggestions, along with a studious observance of the traffic rules and regulations of the particular states and municipalities in which the cars are to be operated, will tend to make safe drivers, who will not only be a valuable asset to telephone companies but a very tangible factor in economical operation.

The real causes of automobile accidents fall under comparatively few causes, the most common of which are recklessness, carelessness, inattention and ignorance of operation. Train away from these, and despite the enormous increase in the number of machines being placed on the highways annually, accidents cannot help but be reduced to a minimum.

As in the case of any other tools in use, let the manager in charge assure himself by frequent inspection that his machines are kept in first-class condition and that his drivers operate them with both the good of the public and the company at heart. Give the driver proper cooperation in having needed repairs made promptly. He is the man who has the driving to do; and if he is willing to keep his car in good condition, he deserves unqualified support.

Yakima Valley Systems Purchased by Oregon Company.

Merger of four Independent telephone companies in the Yakima Valley, Wash., and their purchase for $200,000 by the Oregon-Washington Telephone Co., Hood River, Ore., was announced July 14. It was said $200,000 would be spent soon in improving the lines and service.

The merger combines 2,600 telephones in the lower Yakima Valley with 3,200 in Oregon and southern Washington, making a network of lines reaching almost to Portland.

Lines purchased were the Outlook Telephone Co., Outlook, and Valley, City of Sunnyside and Sunnyside telephone companies. John E. Smithson, Hood River, president of the Oregon-Washington company, will be in active charge of reconditioning the lines, it was said.

A. T. & T. Co. Makes Favorable Showing for Six Months' Period.

The six months' report of the American Telephone & Telegraph Co., issued July 14, shows a substantial increase in gross revenues and net income over the same period in 1924, with net additions to plant in the half year ended June 30 amounting to $125,000,000.

The estimated net income was $52,341,128 after charges and taxes, comparing with $42,590,181 in the same period of last year. In 1923 net income for the six months amounted to $40,047,082 and in 1922, $32,364,133. The gross revenue for the first half of 1925 is reported at $87,264,770, compared with $73,528,504 in the first half of 1924, $68,169,377 in 1923 and $59,656,562 in 1922.

The net income of $52,341,128 is equivalent to $5.80 a share earned on the $902,085,200 average amount of capital stock outstanding. In the same period of last year net income was equivalent to $5.69 a share on $748,236,400 average amount of stock outstanding. A detailed comparison with 1924 figures follows:

Earnings	First Half 1925.	First Half 1924
Dividends	$36,623,551	$29,390,660
Interest	8,928,720	7,101,689
Tel. op. revenues	41,481,398	36,800,723
Miscel. revenues	231,102	235,432
Total earnings	87,264,770	73,528,504
Exp., incl. taxes	24,200,850	22,576,746
Net earnings	$63,063,920	$50,951,758
Interest	10,722,792	8,361,577
Dividends	39,631,933	33,670,638
Surplus	$12,709,195	$ 8,919,543

Average Per Station Investment in Ohio, Amounts to $179.

For every dollar of operating revenue received by public utility companies in Ohio last year, there was an average investment of almost $4. Telephone companies in the state had an investment of $3.51 for every dollar received in revenue.

These figures are shown by a compilation of the annual reports made by the electric light and power, telephone, electric railway and gas companies in Ohio to the Ohio Public Utilities Commission. An analysis of these reports further reveals that the average station investment for telephone service was $179.31.

Conference in Eastern District

Meeting of A, B and C Class Member Companies of National Association in Eastern District Held at Conneaut Lake Park, Pa., in Connection with Summer Meeting of Pennsylvania State Telephone & Traffic Association

The summer meeting of the Pennsylvania State Telephone & Traffic Association, held at Conneaut Lake Park, last week developed into a three-day meeting, due to the fact that the conference of the class A, B and C member companies of the United States Independent Telephone Association of the eastern district was held at the same time. In fact, the conference discussions made up the entire program except that on the second day, Thursday, July 23, W. S. Paca, of Oil City, general manager, Petroleum Telephone Co., presented a progress report as a member of the state committee on safety rules for inductive co-ordination.

All arrangements for the meeting were in charge of John Z. Miller, of Erie, president of the western branch of the Pennsylvania association.

The conference of the United States Independent Telephone Association was attended by about 60 representatives of some 35 member companies in the three states of Pennsylvania, New York and Ohio.

The conference was opened Wednesday afternoon, July 22, with President F. B. MacKinnon of the national association presiding. Meetings were also held in the mornings of Thursday and Friday.

The accounting questions were handled by Vice-President Frank J. Brookman, of the Rochester Telephone Corp., Rochester, N. Y., chairman of the accountants' section, Eastern district, assisted by S. G. Bowie, auditor of the same company, and A. L. Geiger, of the Washington office of U. S. Independent Telephone Association.

The main topics discussed were the handling of depreciation and maintenance accounts, particularly account 607, Interstate Commerce Commission, Station Removals and Charges, and No. 611, Interstate Commerce Commission, Repairs Charged to Reserves.

Tabulations were distributed showing the results of operations of the 13 A class companies, 23 B companies and 21 C companies, and statements were submitted showing the percentage relations of depreciation and corporate surplus reserves to fixed capital.

On this page is reproduced a table presenting a comparative summary of the three classes of companies in these states for the years 1916 to 1924 inclusive.

The statistics for the eastern district differed from those presented at the conferences held in other districts in that the C companies in the eastern district show as large a gain in telephones as the A class companies, while in the other districts the C companies have shown the least gain of the three classes of companies. The C companies in the eastern district also showed the largest return of the three classes of companies while in the other districts the A companies showed the largest return.

The interest shown in this conference was as great as that manifested at the other conferences that have been held. As an indication, it might be stated that the attendance at the closing session was just as large as at the opening session.

An operators' school was conducted by Mrs. Mabel Pearson Sellvin, chief operator, Jamestown Telephone Corp., Jamestown, N. Y. Three sessions of the school were held, with a total attendance of 100.

On the evening of Thursday, July 23, an informal banquet, attended by over 200, was held. W. J. O'Hea, assistant to president, Rochester Telephone Corp., Rochester, N. Y., acted as toastmaster, his reputation for most acceptably filling such an office having extended beyond the confines of his home city.

During the course of Mr. O'Hea's discussions auxiliary remarks were made by Frank L. Beam, Mt. Vernon, Ohio; J. G. Ihmsen, Albany, N. Y., vice-president and general manager Up-State Telephone Association of New York; W. S. Paca, Oil City, Pa., vice-president and general manager, Petroleum Telephone Co.; W. H. ("Pop") Wilson, Clearfield, general manager, Huntington & Clearfield Telephone Co.; F. L. McKinney, Columbus, Ohio, secretary-treasurer, Ohio Independent Telephone Association; H. E. Bradley, Harrisburg, Pa., president, Pennsylvania State Telephone & Traffic Association; Fred C. Saunders, Wellsville, N. Y., Allegany County Telephone Co.; John H. Wright, general manager, Jamestown Telephone Corporation, Jamestown, N. Y.; and F. B. MacKinnon.

The community singing was led by Danny Morgan of the Hazard Mfg. Co., Wilkes Barre, Pa., who also sang several solos most acceptably.

	1916.	1922.	1923.	1924.	1916–1924. Increase.	1923–1924. Increase.
No. of central offices	424	463	457	458	34	1
No. of telephones	283,949	388,889	410,142	436,125	152,176	25,983
Miles of toll wire	.....	.....	21,254	36,635	.....	15,381
Fixed capital	$40,483,364	$57,753,915	$56,831,465	$61,086,718	$20,603,354	$4,255,253
Total assets	45,139,196	64,830,065	64,453,817	70,502,553	25,363,357	6,048,736
Capital stock	18,841,467	27,406,932	28,200,100	31,122,251	12,280,784	2,922,151
Funded debt	15,767,688	17,058,445	16,827,948	20,734,865	4,967,177	3,906,917
Operating revenue	$ 6,388,329	$12,924,200	$13,866,628	$14,788,069	$ 8,399,740	$ 921,441
Depreciation	716,881	1,986,904	2,161,753	2,407,762	1,690,881	246,009
Current maintenance	1,179,345	2,365,263	2,452,056	2,564,602	1,385,257	112,546
Traffic	1,204,998	2,961,963	3,058,298	3,161,490	1,956,492	103,192
Commercial	375,897	908,737	994,527	1,030,796	654,899	36,269
General and miscellaneous	538,697	1,072,850	1,046,321	1,095,040	556,343	48,719
Total operating expenses	*4,037,704	9,295,717	9,712,955	10,259,690	*6,221,986	546,735
Net operating revenue	2,350,625	3,628,482	4,153,673	4,528,379	2,177,754	374,706
All other revenue	785	40,424	115,548	118,313	117,528	2,765
Taxes	$ 300,804	$ 836,319	$ 934,437	$ 1,023,924	$ 723,120	$ 89,487
Other deductions	263,346	373,343	436,925	484,514	221,168	47,589
Total deductions	564,150	1,209,662	1,371,362	1,508,438	944,288	137,076
Income available for interest and dividends	$ 1,787,260	$ 2,459,245	$ 2,897,859	$ 3,138,254	$ 1,350,994	$ 240,395
Interest	838,734	1,050,548	1,113,661	1,135,114	296,380	21,453
Available for dividends	948,526	1,408,697	1,784,198	2,003,140	1,054,614	218,942
Percentages:						
Income available for interest and dividends to fixed capital	4.4	4.3	5.1	5.1	Percentage of increase in No. of telephones:	
Net income to capital stock	5.0	5.1	6.3	6.4		
Interest to funded debt	5.3	6.2	6.6	5.5	1916–24—53.6	
Depreciation rate	1.8	3.4	3.8	3.9	1923–24— 6.3	
Operating ratio	63.2	71.9	70.0	69.4	1922–23— 5.5	

*Expense total does not balance to detail, due to detail information being missing on some companies.

General Comparative Summary of Financial Statistics for Class A, B and C Member Companies of United States Independent Telephone Association in the Eastern District (Ohio, Pennsylvania and New York) for 1916 to 1924, Inclusive.

Fiction-Story Publicity Big Success

How a Telephone Company Wove Fiction Around Fact in Explaining Its Service to the Public—Increase in Toll Business and Speeding Up of Service Result of Patrons Learning to Make Intelligent Use of the Telephone

By R. W. McPherson

An Independent telephone company in the Middle West discovered that the fixed charges for certain services it rendered the public were insufficient to cover the cost of the services. Theoretically, these charges should have paid a fair profit. The trouble was found to be caused by a general misconception concerning these services, among the patrons of the company.

The writer was called in and, after a series of conferences, was given an advertising appropriation to be used solely in educating the patrons of the company as to how to use these services to the best advantage.

This campaign resolved itself into a series of direct mail pieces and folders, depending entirely upon a fiction-story form to secure and hold the reader's interest. The most successful piece of this series proved to be the following story which visualized the many uses of long distance telephone service.

"A Fool May Enter—While the People Wait"—A Story from Life.

There were thirteen of us, all traveling men, including The Fool. We were holed up in a typical small town because of a three days' rain. And still it rained!

A large, rather florid man stepped to the telephone. "Take these calls," he said to the operator. There followed a list of six calls, one to Kansas City and five to his customers in surrounding towns.

"Think of it," my companion remarked, "rain, storm—nothing matters. Tie up the railroads, the automobiles—no matter—commerce goes on. Here are thirteen peddlers and all of us will do a fair business today in spite of the rain."

I turned to see The Fool impatiently shaking the receiver hook up and down. "What's the report on Blank's call to Kansas City?" he snarled to the operator. My companion had his watch out.

"Four minutes," he said slowly when the man at last hung up. "Four minutes the public waited and commerce stopped while The Fool held sway. Four minutes while the operator was forced to tie up a line to get a report through from Kansas City. And very likely that man does not realize that his own call has been delayed—just four minutes."

"The long distance system must be wonderfully efficient," I mused. "What is the secret of this efficiency?"

"Common sense," he replied, "accomplishing the most with the least effort. If people would only realize this, they would not only speed up the service but actually save money on their own calls.

"Long distance calls are classified. The Fool now showed a rare judgment when he called for *anybody* at his house. That is, called a station-to-station call. It requires the least operator's labor, because the average station-to-station call is handled but once by the operator, thus entailing a minimum use of the toll line, and is therefore the quickest and cheapest of all calls."

Again The Fool was at the telephone.

"Say, operator," he said, "I forgot to tell you that I want the charges on that Kansas City call reversed."

"Huh," my companion snorted, "and I gave him credit for judgment! Now he has killed the station-to-station call by reversing the charges. It will go through now as a person-to-person call at a higher rate, and in the meantime he has tied up the line for more valuable minutes."

"How about evening and night rates," I asked.

"Owing to a lighter toll load after 8:30 p. m., it is possible to offer an evening station-to-station rate which is one-half the person-to-person rate. The evening rates apply from 8:30 p. m. to midnight. A night rate, applying from midnight to 4:30 a. m., is offered at one-fourth the person-to-person rate."

"Go on," I said, "I'm learning."

"All rates are based on the service required," he went on. "The person-to-person call, where you desire to talk to a specified person, requires the most labor and, consequently, is about two-fifths higher than the station-to-station day rate.

"If it is necessary to summon your party to the telephone, it becomes a messenger call and is one-fifth higher than the person-to-person call plus the messenger charges. An appointment call is just what its name implies. You ask the operator to make an appointment to talk to your party at a specified time. The rate is one-fifth higher than the person-to-person call. Now what—"he broke off, for The Fool was again at the telephone.

"Operator," he said sweetly, "you can cancel that call to Kansas City. What? Report charge? Oh, well—yes, I'll pay it here." A dime twinkled in the box. He slammed up the receiver and walked away muttering.

"And the report charge?" I asked my companion with a smile.

"Protection!" he snapped. "Protection for the public against the fools of the world. And just a small recompense to the company for the work it has been to when calls like that of your friend don't go through because of no fault of the company's."

"How lucky that the fools are scarce," I mused.

"Yes, and they are scarce," he answered. "The system stands and renders service effectively only because the majority of the public is sufficiently intelligent and courteous to cooperate. And the service is increasing in efficiency as the intelligence and cooperation of the public develops."

"Say," I asked, "How long have you been with the company"

"Wrong, son," he answered, "I'm not with them. I sell shoes. I topped the force last month, and between you and me the few dozen pairs of shoes that beat the next highest man were sales that came as result of knowing how to use long distance—and working it hard.

"Every town or village in the state is within speaking distance of the market centers. In Nebraska alone, 225 companies, each a separate unit, are working in wonderful harmony. Right here in Nebraska messages are buzzing over 60,000 miles of telephone wire."

"Who holds them all together?" I asked.

"People," he answered. "Men, girls, and the courteous cooperation of the public, in spite of the occasional fool—and there you have the answer."

* * *

This story, in booklet form, was distributed among the business men throughout the territory covered by the company. Favorable results were immediate. Wholesale and manufacturing firms requested additional supplies of the booklets for the

VIEWPOINT OF THE MASSES

In the case of a public utility such as ours, we are dealing with the masses and must be governed by their point of view.

The man who does not seek to understand that point of view, and then meet its requirements, fails in the entire purpose to which he is giving his business effort. No man makes a good chief who is not a good servant.—J. S. McCulloh, president, New York Telephone Co.

use of order clerks, salesmen, and for distribution to their dealers.

An appreciable increase in toll business resulted, but the greatest advantage came through the speeding up of the service as the patrons learned to use it intelligently.

A similar booklet was mailed to the residence subscribers, explaining a very common cause for dissatisfaction—the change-of-name charge. This dissatisfaction was very well summed up in the title we used for the booklet, "What! $1.25 for signing my name!"

The story started by agreeing and sympathizing with an outraged subscriber. The conversational narrative then carried him on a tour through the plant, explaining in detail every operation in the service.

The story ended in a final summing up of the actual time involved in the operations and showing in a simple, understandable way that the patron actually received the services of skilled labor at the ridiculously low cost of 20 cents per hour.

Each troublesome charge was handled in a similar manner, and in every case the results were gratifying not only to the company, but also to the advertising firm producing the work.

In the case of the first booklet, the live merchant quickly recognized a value to his own business through the information it contained. Advertiser, consumer and printer were left with a warm feeling of satisfaction.

This first success has resulted in many of our public service corporations adopting the fiction-story form of graphic explanation to the public. It brings a tang of "best-seller" interest to a type of business that has never found straight advertising profitable. It pays the advertiser, pleases the consumer and creates a constantly increasing demand for direct-mail matter.

Net Income of New England Bell Shows Decrease.

For the five months ended May 31 the New England Telephone & Telegraph Co. reports net income of $1,011,403, after all charges and taxes, equal to $1.21 a share on the $83,025,400 capital stock outstanding. This compares with net income of $1,770,554 reported in the first five months of 1924, equal to $2.66 a share on the $66,476,200 stock outstanding at that time.

Teamwork Between Departments

Teamwork Among Employes and Between Various Departments Necessary to Success of Telephone Company—Some Factors Involved in Proper Teamwork—Paper Presented at Convention of Up-State Association of New York

By Miss Bertha Eckard,

Chief Operator, Oswego County Independent Telephone Co., Fulton, N. Y.

Teamwork is one of the most essential means of success in any business concern, whether telephone or otherwise. We must have teamwork among all employes in the company and between departments. The smaller the company, the closer these departments are associated. In fact, each one is of vital importance to the others, whether large or small.

Most important of all is the teamwork in the traffic department, as this department is the biggest asset of the company. The operators and the supervisory force of this department deal with a more varied condition than is found in the plant or commercial departments. The service we sell, even under favorable plant conditions, would be poor if the operating department were a failure.

The operator of this department is responsible for the manipulation of the appartus. Teamwork begins with the training of the operators. By careful training they will be interested in the improvements in the service and consider it an important part of their telephone career. They will cooperate with the supervisor and be willing to accept correction, when corrected, as it will improve their work, as well as the service.

Careful handling of equipment must also be respected. More often it is the operator, who finds most of the faulty apparatus, such as poor transmission, signals, poor cords and line trouble. This trouble is referred at once to the supervisor or chief operator, who immediately reports it to the plant department.

Now we must expect teamwork from the plant department to see that these lines and equipment are repaired as soon as possible. The subscriber knows the operator as a voice and the service she renders, while they know the plant department, partly by the kind of work in their homes, when installing a telephone. The installer should see to it that the telephone is not only "good enough" but right.

Teamwork and Harmony Between Departments, Says Miss Eckard, Is the Key to Success in the Telephone Business.

Very often loose connections on a telephone give the subscriber, especially new ones, the wrong impression of the operator and the company. When repairing a telephone, the repair man may be greeted with complaints from the subscriber. He should be a good listener and very often can satisfy the subscriber by explanation or, if possible, show where the trouble is. If not, he makes a note of the trouble and reports it.

Any employe receiving a complaint should not try to satisfy the subscriber by placing the blame on some particular department, even though it is evident where the trouble exists. What the subscriber wants is better service—and he is not particularly interested in knowing whether the plant, traffic or commercial department is at fault.

The chief operator and the wire chief make out reports, which should go to the manager for his personal perusal, so he will be kept in touch with the affairs of each department. The manager should hold the wire chief responsible for the maintenance and construction of the plant and should confer with him frequently relative to improving and constructing additonal plant requirements.

Frequently service complaints are not reported to the trouble operator or the traffic chief, but are sometimes reported on the street, or elsewhere, to the manager.

The manager should not think mildly of the subscriber's complaints, but should have a notebook and jot down the subscriber's name and number and nature of complaint. This makes the subscriber see that he is interested in his service. He will then refer these notes to the traffic chief, who, cooperating with the manager, investigates the complaint and locates the trouble, if possible. She then calls the

FEAR AND FAILURE

By Miss Anne Barnes,

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

Whenever I meet a chief operator who hesitates about making changes which seem necessary for the betterment of service, I know she is afflicted with what is now known as fear-complex.

This state of mind is first brought on because of her lack of knowledge of her responsibilities. I feel very sure of this, because when she knows her responsibilities thoroughly, this fear leaves her and her very confidence in herself inspires her employes to follow her direction. I believe there is no situation quite so disorganizing as is one in which the leader of a group is dominated by one or two on her force. It is her own fault and my sympathy is with the employes under her supposed supervision.

If, in her desire to hold the head position, after a serious conference with her manager, she starts a coercion program with her operators, she has made a wrong start. She should start with herself first and win the respect of her operators by becoming fit to handle the responsibility for which she is drawing the salary. Then the thing which she has feared to do and say will come s—o e-a-s-y. Try it!

Fear and Failure go hand in hand and as long as one fears, she fails.

We meet people every day who fear to say the right thing when their advice is asked or when they know what is the right thing to say. The reason for this is that they fear to hurt feelings. There seems to be no reason for some of the things they do.

They make an engagement to meet or see you, knowing full well they never intend to do so, but they think it an easy way to avoid hurting your feelings. They do not consider what changes you may have made in your program to meet them. No, they never think beyond the avoidance of offending you.

When their advice is asked, or they are called upon to make a decision, they are so careful not to offend that they even tell an untruth, sometimes.

MORAL: Fear is a gaoler and Failure is a gaol.

subscriber and explains, assuring the subscriber of the interest shown in our service, not only by the manager, but by the operators. Operators should be urged to listen to complaints and report them to the proper person.

It is also the work of the manager to see that the operating room is kept in orderly arrangement, such as walls properly papered, or painted, and the floors clean. Operators can work 50 per cent better in a clean, orderly office than in a dilapidated, untidy one. This is also true in the plant department.

With teamwork and harmony existing between the departments and every one pulling together, what else can exist but success?

Nebraska Company Purchases Non-Competing Farmers Company

The Madison Telephone Co., Madison, Nebr., has completed negotiations by which it takes over the property of the Madison County Farmers Telephone Co. It has asked the Nebraska State Railway Commission for authority to issue $13,000 of preferred stock, which will be used in purchasing the interests of owners in the property taken over. It also desires authority to issue $7,000 more preferred and $3,130 common stock to reimburse the capital account for additions and betterments made and also to finance other additions and betterments.

The properties of the two companies do not parallel in any respect the farmers' company serving territory never touched by the Madison company lines. The last report of the two companies showed that the farmers company had assets of $23,224, and served 206 subscribers, while the Madison company served 1,062.

The latter company recently purchased the property of the Tilden company, operating at the town of that name some 20 miles distant, for $18,000. The company now has stock outstanding of $42,990, assets of $85,748.28, a surplus of $16,886.96 and a depreciation reserve of $23,144.

Clover Leaf Telephone Co., Lathrop, Mo., Changes Owners.

The Clover Leaf Telephone Co., operating some 600 telephones at Hopkins and Lathrop, Mo., has been sold to Pross T. Cross, of Lathrop, acting trustee for a group of men who plan to incorporate under the name of the North Missouri Telephone Co.

New Hampshire Convention to Be Held in September.

The annual convention of the Telephone Association of New Hampshire will be held at the Huntoon House, Keyser Lake, North Sutton, N. H., September 17 and 18.

Personal and Biographical Notes

E. D. Schade, secretary and general manager of the Johnstown (Pa.) Telephone Co., **J. B. Edwards,** president, and **Seymour Guthrie,** treasurer, of the Kellogg Switchboard & Supply Co.; **P. C. Burns,** president of the American Electric Co., and **H. D. Fargo,** president of TELEPHONY, left Chicago Thursday, July 30, for a trip through the Pacific northwest and Canada on a tour arranged by the Golfers' Magazine.

F. B. MacKinnon, president of the United States Independent Telephone Association, left Chicago this week with his family for an extended trip on the Pacific Coast. Business will be combined with pleasure by Mr. MacKinnon on this trip. He will preside at two conferences of member companies of the national association, one to be held at Long Beach, Calif., and the other, at Seattle, Wash. He will return to Chicago the early part of September.

Howard O. Leinard, of Cleveland, Ohio, assistant to vice-president, American Telephone & Telegraph Co., last month enjoyed a delightful motor trip through the East, including parts of Maine and also the scenic White Mountain district, with his wife and son, Charles.

H. E. Bradley, of Harrisburg, Pa., president of the Pennsylvania State Telephone & Traffic Association and a director of the United States Independent Telephone Association, recently had the honor of having his physiognomy reproduced in a local newspaper accompanied by the following humorous sketch in the column heading, "The Velvet Hammer":

"We've lots of conversation in the world on which to live, for every one has news to tell or good advice to give. The weight of all the well-known words with which the plant groans is daily redistributed by **Bradley's telephones. He heads in state**

and nation groups of Independent gents who string their poles to worth-while goals and cop the dimes and cents.

The subjects buzzing on the wires which Mr. Bradley strings would show, no doubt, if sorted out, all kinds of little things, but any time you hear him talk his topic is the same—he clarifies in accents wise the great and only game, for golf is strife and golf is life, with each the self-same goal; no man can mend his chance to end—it's one more grass-grown hole.

But long, say we, may H. E. B. continue to declaim and edify the other guy regarding either game. In Masonry his last degree is No. 32, a long rough journey from the lodge original and blue. He helped to hang the highways with the telephones which call for aid when Lizzie lags and droops and drags and cannot make the grade."

S. T. Huebner has retired as manager of the Northwestern Bell Telephone Co.'s exchange in Burlington, Iowa, after having been in charge of the plant for 33 years. Although Mr. Huebner is entitled to retire on pension, he will remain with the company in an advisory capactiy. Harold J. Knight, of Des Moines, will succeed Mr. Huebner as manager at Burlington.

Mr. Huebner was a student at Oberlin College, Ohio, in 1882, when he first became connected with the company. After serving in various capacities in several Ohio cities he was transferred to Omaha as purchasing agent for the company in Nebraska. Later he was made manager at Beatrice, Neb., and in 1882, at his own request, he was made manager at Burlington.

At that time there were 285 telephones in use in Burlington with six employes, in addition to Mr. Huebner. During his incumbency as manager the exchange has grown until today it operates 7,300 stations, employing 70 operators and about 30 other employes.

Obituary.

Meyer Goebricher, secretary and general manager of the Conneaut Telephone Co., Conneaut, Ohio, for the past 15 years, passed away Sunday morning, July 12, at his home in Conneaut, after a partial invalidism of several years. He was 63 years of age at the time of his death.

Mr. Goebricher was born in Frederick, Md., and was educated in an academy in that city. As a young man he learned the tailoring trade and in 1884 he entered the tailoring and men's furnishing business in Conneaut, Ohio.

In 1906 he became secretary and general manager for the Conneaut Telephone Co., which positions he continued to fill until his decease.

Mr. Goebricher was one of Conneaut's most prominent citizens and was active in many local business projects. He was secretary of the Conneaut Building & Loan Co. since 1898. He was a Mason and an Elk and a faithful member of the Methodist Episcopal Church of Conneaut.

Surviving Mr. Goebricher are his wife and his two sons, Russell and Joe.

G. E. McFarland, president of the Pacific Telephone & Telegraph Co. from March, 1913, to January, 1925, and chairman of the executive committee since the first of the year, died at San Francisco, Calif., July 17, after an illness of two weeks and an operation on July 13. Mr. McFarland was one of the most widely known and best loved telephone executives in the country. He was actively engaged in the telephone business for more than 45 years and was 62 years old at the time of his decease.

The Late George E. McFarland, Chairman of Executive Committee, Pacific Telephone & Telegraph Co.

His career was one "splendid in accomplishment and strong and beautiful in incentive and example, whose chief attributes were character, industry, study, thought, helpfulness and loyalty," to quote from a story on Mr. McFarland written several years ago by Charles E. Hall, secretary of the Northwestern Bell Telephone Co. and published in The Northwestern Bell.

Mr. McFarland commenced active work in the telephone field with the Marshalltown Telephone Co., Marshalltown, Iowa, in May, 1880. Previous to that time he had been interested in the telephone as a boy, commencing in 1877 and building experimental telephones and lines, taking a course in the State University of Iowa and specializing in such studies as were available at that early date which related to electrical subjects.

His first work was the construction of a telephone exchange at Marshalltown, where he remained as lineman and night operator until May, 1882. From that date until June, 1886, he was superintendent of the Iowa & Minnesota Telephone Co., with headquarters at Dubuque, Iowa. From 1886 to 1909 he was with the Iowa Telephone Co. and its predecessor companies, as division superintendent, general superintendent, and vice-president and general manager.

In 1909 he went to Omaha, Neb., as vice-president and general manager of the predecessor companies of the Northwestern Bell Telephone Co., leaving that post in 1913 to become president of the Pacific Telephone & Telegraph Co.

There was "no magic, hocus-pocus or pull" about Mr. McFarland's rise, declared Mr. Hall in the story previously referred to. His honesty and straightforwardness, his habit of studying long and hard to understand thoroughly the problems confronting him before discussing them, his unusual industry and his spirit of helpfulness and fairness to his associates were given as some of his outstanding traits of character and reasons for his success.

Many stories are related about him to show that he literally never looked at the clock and that he was an indefatigable worker. It was no uncommon thing, says Mr. Hall, for Mr. McFarland to work all day at his duties as superintendent and all night in preparing estimates or drawing diagrams of some intricate circuit in the days when he was the only engineer the company had and in the days before the universities had graduated electrical engineers.

He climbed ice-clad poles, working as hard and taking the same risk as any of his men, yet while they were resting for the next day, he spent half of his night in caring for his correspondence and reports.

During his spare time, little though it might be, he mastered the German language in order that he might study for himself the age-old dispute between Great Britain and Russia over the Afghan boundary and the creation of the "buffer" states.

Mr. McFarland was a constructive thinker. He was able to plan well in economy of construction and maintenance and to provide for efficient service. The habit of thinking brought to him the ability to reason well and to consider and determine relative values.

He was an engineer of more than average ability. Back in the old days in Iowa he was a skilled worker with tools and as a designer of tools he was a master. Payout wire reels designed by him over 30 years ago are still in use. He never had a workman who could excel him in line work or in the installation or assembling of a switchboard.

He always had a vision of the future of the industry and its requirements, believing that it would advance greatly.

The Post Office and the Automatic

Functions of Machine Switching Apparatus in Telephony—Innovations Incorporated in System Being Installed in New London Exchanges—Paper Presented Before British Institution of Electrical Engineers — Second Installment

By Col. T. F. Purves, O. B. E.,
Chief Engineer, British Post Office

The determination of the most economical number and location of exchanges to serve a telephone area involves an exhaustive study of all the costs of providing and maintaining external and internal plant and buildings, and also the cost of operating the plant. This is necessarily prefaced by development studies of all parts of the area, and general traffic estimates, extending many years ahead. Comparison of the costs of alternative schemes is made on the basis of annual charges, capital cost being converted into interest and depreciation and added to the direct annual costs of maintenance and operation.

Layout of Exchange Positions and External Lines.

The main items of cost to be considered in designing the layout are represented by: Subscribers' lines, junction circuits, exchange buildings, equipment and power plant, "A" (answering) operators, "B" (junction) operators.

An increase in the number of exchanges reduces the area to be served by each of them, and consequently reduces the cost of subscribers' lines, both by shortening their average length and by enabling standard transmission efficiency to be attained by the use of a lighter gauge of copper wire. On the other hand, it increases the requirements for junction circuits, buildings and power plant. The optimum number of exchanges is represented by the layout which reduces the summation of all these costs to a minimum.

The number of exchanges required for the most economical service of an area on the automatic system differs materially from that required for the service of the same area on the manual system.

The main reason for this is the fact that junction circuits can be provided much more freely in an automatic system, since they do not carry with them the heavy operating costs which accompany their use in a manual system.

In the automatic case, only the plant costs of the junction system come into the calculation, and fuller advantage can therefore be taken of the economies represented by shortening the subscriber's lines. As a consequence, the adoption of automatic service in any large area generally involves an increase in the number of exchanges and a reduction in their average capacity.

The foregoing does not apply to portions of an area in which the telephonic density is such that exchanges of 10,000 lines' capacity are justified under either system. This number of lines happens to represent the practical limiting capacity of both manual and automatic exchange units, the limit in the manual case being the maximum number of connecting points which an operator is physically able to reach, and in the automatic case the decimal limit of the number of lines ever required at one point. The theoretical locations of exchanges in a dense city area are, therefore, the same for both systems. In either case two or more 10,000-line units are housed in the same building if convenience so dictates.

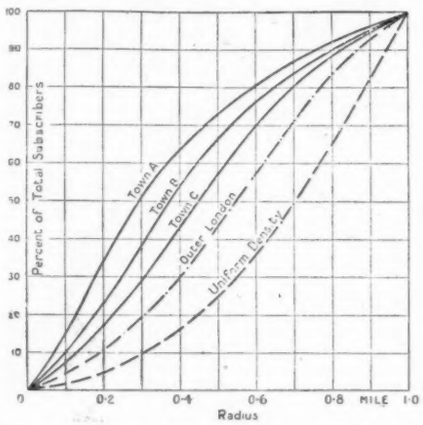


Fig. 3. Number of Subscribers Within Various Radii, Shown as Percentage of Subscribers Within One Mile Radius.

The economies in line plant that can be realized in a properly laid-out automatic system, as compared with a good layout on a manual basis, are considerable. Calculations made about three years ago in connection with the layout of the London area showed that the costs of the line plant for the automatic system, at or about the year 1945, would be nearly 30 per cent below those of the manual system.

In the matter of exchange buildings the automatic system also enjoys a certain advantage. Accommodation for operators is not required at many of the smaller exchanges, while at larger centers, where provision is made for inquiries and certain classes of traffic to be dealt with by operators, the amount of such accommodation required is comparatively small. The plant serving a given number of lines can therefore be housed in smaller and cheaper buildings. This advantage is partly discounted by the fact that the average number of lines per exchange is less in the automatic system, and more buildings are required than would be the case in a manual layout.

In general, the cost per line of small buildings is greater than that of larger buildings, but it is found that the automatic system introduces an overall economy of about 13 per cent in the cost of exchange sites and buildings. The total economy in external line plant, sites and buildings, which may be credited to the automatic system is about 23 per cent as compared with the manual system.

Reduction in the size of exchanges below a critical figure of about 3,000 lines also increases to a certain extent the cost per line of power plant and of automatic switching equipment for handling a given amount of traffic. These factors, therefore, tend, so far as they go, to keep up the size of exchanges of smaller capacity than 3,000 lines.

In this respect automatic conditions differ markedly from those of the manual system, in which the high cost of the multiple equipment and its cabling causes the cost of exchanges, per line, to increase very rapidly with their size; this increase is, of course, much more than counterbalanced by the economies in junction working which attend the gathering up of the lines into large exchange groups.

The methods of calculation adopted in determining the layout of automatic exchange areas can be referred to only briefly.

The telephone system in this country is laid out in local fee areas covering all territory within a radius of five miles of a main exchange, with the exception of some of the largest towns which have a greater radius, up to 10 miles in the case of London. It is usual to consider the layout for one of these areas as a whole, but in making a detailed study the area has, of course, to be divided up into small portions, each covering the maximum territory that might be served from one exchange. The costs of serving this portion from one, two or more exchanges are then calculated, and the most economical arrangement ascertained.

In order to calculate quickly the economical layout of various telephone areas it is first necessary to prepare graphs showing the cost variation of each of the

following items for different sizes of exchange:

(*a*) Subscribers' lines.

(*b*) Junctions to carry traffic which would be created by increasing the number of exchanges serving each portion of the area, as explained above (these will be referred to later as "local junctions").

(*c*) Junctions to other exchanges, in so far as they vary with the size of exchange.

(*d*) Building and power plant.

Other costs, such as that of subscribers' instruments, are independent of the size of exchange and therefore do not enter into the calculation.

In applying these factors to the problem of determining the most economical size of exchange in areas of various densities, they are all expressed in the form of annual cost per subscriber's line and plotted against the size of exchange.

The calculation of the cost of the subscribers' line plant is somewhat complicated, but certain approximations can be made which simplify the work considerably. To determine the basic costs involves numerous calculations of the capital costs of various cable routes comprising different types of cable and different numbers of ducts laid under all classes of roads, with additions for overcoming difficulties depending on the particular locality being considered. From these and investigations into the lives of the various components of the plant, the interest and depreciation charges are derived. An allowance for maintenance is then added giving the total annual cost per mile of each type of circuit.

Fig. 3 shows the distribution of subscribers in a few typical cases, expressed as percentages of the total within a one-mile radius of the exchange. The curve for "uniform density," which is, of course,

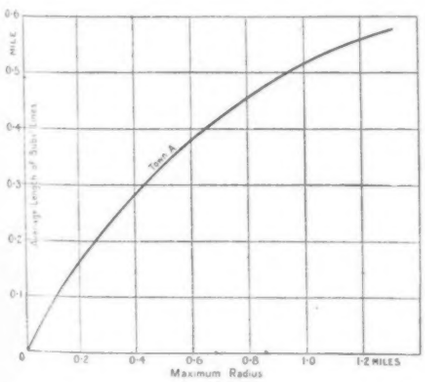


Fig. 4. Average Lengths of Subscribers' Lines Within Various Radii.

the simple geometrical curve representing increase of area, gives the largest percentage of subscribers in the outer portions of the area and represents one extreme condition.

The nearest approach in practice to uniform distribution is found in the central districts of large cities. The curve for the districts of outer London, which is also shown, approaches more closely to the curves for smaller cities. The other curves represent towns in which the density diminishes, in various degrees, from the center outwards. The curve most nearly representative of the area being studied is taken. From this graph, curves are prepared showing the average length of subscribers' lines within any maximum radius, due allowance being made for the difference between route mileage and radial mileage.

Owing to the fact that the cable routes have to follow the lines of streets, the route distance is much in excess of the radial, and generally the ratio is highest for the lines nearest to the exchange. From an analysis of a large number of exchange areas an average ratio of route to radial measurement at various distances from the exchange has been arrived at and is used for working purposes.

Fig. 4 shows, as an example, the curve for an area similar to town A of the previous figure. From such curves and the cable cost per mile, the average cost per subscriber's line is ascertained.

The number of junctions required depends upon the traffic, which can be estimated from records of the traffic under existing conditions, and upon the number and methods of connecting the outlets from selector switches used in the switching system adopted. In estimating the cost of these junctions due allowance must be made for the various gauges of conductor necessary to give the required transmission efficiency, and for loading where this proves more economical than the provision of heavy conductors; the limits of resistance imposed by switching and signalling requirements have also to be taken into account.

Detailed capital costs have been estimated for each of the types of cable necessary and the annual costs per mile of circuit have been arrived at as described previously. In this manner a curve showing the cost of junctions against size of exchanges for any particular area can be prepared.

Fig. 5 shows combined building and power plant costs based on statistics of a large number of existing exchange buildings. It has been necessary to ascertain capital costs of sites and of buildings specially designed for automatic exchanges, with all incidental accommodation. On this, the interest and depreciation are calculated, and the charges for maintenance, cleaning, heating, etc., are added.

The annual charges for the power plant are arrived at in a similar way. For automatic exchanges over about 3,000 lines the cost of power plant, maintenance, etc., is practically the same per line; but as the size of exchange decreases, this cost increases, as already mentioned. Hence the 3,000-line exchange is taken as a datum point and only the excess cost for exchanges of smaller capacity is brought into the graph. The curve shows that the accommodation cost for exchanges of 1,000 lines is about 12s. per line per annum,

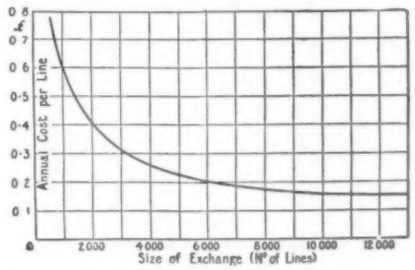


Fig. 5. Annual Cost of Automatic Exchange Buildings.

reducing to about 4s. per line in the case of the largest exchanges.

The first step preparatory to dealing with the layout of an exchange area is to have a detailed development study made of the whole area to ascertain the number of subscribers likely to be obtained in the future, and their distribution. The Post Office practice is to have these forecasts plotted on plans to show the number of subscribers anticipated in each small portion of the area, say in 16ths of a square mile, at 5, 10, 15 and 20 years ahead.

In the case of an ordinary provincial town an inspection of this plan shows that there is always a fairly definite business center where the telephone density is high, falling off rapidly towards the suburbs. This condition calls for a large exchange in the center, the best position for which is generally more or less obvious, and this may be surrounded by one or more rings of small exchanges. The most economical position of the central and adjacent exchanges is then determined by inspection and a comparison of the costs of two or three alternatives.

Although the process is necessarily laborious, involving a large mass of calculations, an engineer experienced in this class of work can, within a reasonable time with the aid of these curves, work out the most economical layout for all but the largest towns.

In dealing with the larger towns, however, especially London, such a method would be unwieldy, and therefore the problem has to be attacked in a more indirect manner. It is assumed that the density, or number of subscribers per square mile, will be fairly uniform over the small portions of the area to be studied in separate detail, which in the central part of the area is reasonably accurate. In order to relate the average length of a subscriber's line, and therefore the cost, to density and size of exchange, the graph shown in Fig. 6 has been prepared, based on Fig. 3 and the average cable costs.

It will be noticed that the base of the graph is the radius of an equivalent cir-

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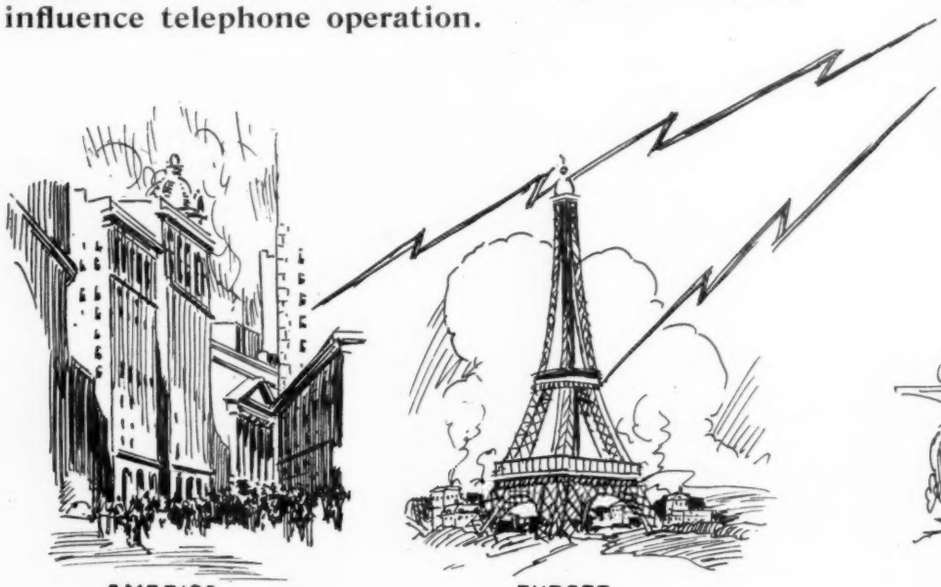

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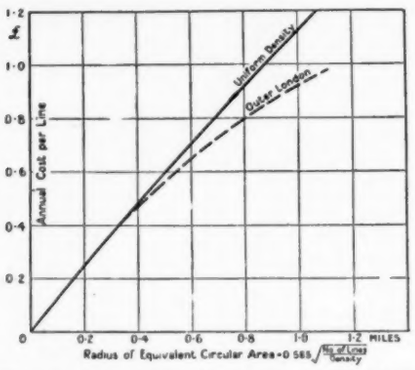


Fig. 6. Annual Cost of Lines in Various Areas.

cular area, not the size of exchange as in other graphs. This is found convenient for purposes of calculation because it combines the two independent variables, size of exchange and density. Numerically, the density is the number of subscribers per square mile.

In practice, of course, the exchange area is never circular but, provided it is not very irregular and the exchange is properly placed at the telephone center (that point which makes the total mileage of wire a minimum), the assumption introduces no serious error.

By means of this curve and the curves for junction and building costs already referred to, the economical size of exchange to serve an area of uniform density is arrived at, and a further curve (Fig. 7) can then be prepared giving the economical size of exchange for each density. Having this curve and the map showing the densities, the areas and location of the exchanges can then be set out, corrections being made for non-uniformity of density and other special conditions.

The application of the method may be illustrated by taking a typical area having a density of 1,500 subscribers per square mile. Fig. 8 shows the costs of subscribers' lines varying with the size of exchange, obtained from the curves already prepared. Fig. 9 shows similarly the cost of junction lines. The curve of total costs, Fig. 10, shows that for a density of 1,500 the economical size of exchange is about 2,000 lines.

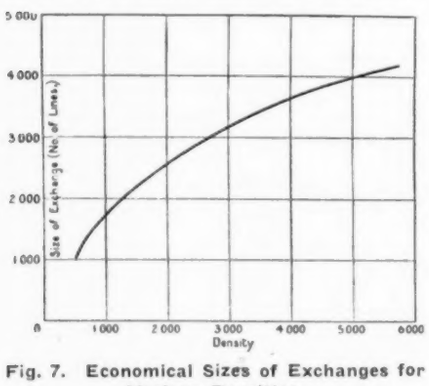


Fig. 7. Economical Sizes of Exchanges for Various Densities.

It will no doubt be appreciated that this process represents only the first step in a case where an automatic system has to be grafted into an existing manual system. Allowances must be made for such factors as the layout of existing plant and the necessity for replacing each portion of the manual system only when it is economical to do so. This involves many considerations which it is unnecessary to detail here, but which all add to the complication of the problem confronting the engineer responsible for the layout of an exchange area and the economical introduction of the automatic system.

Calculation and Layout of Internal Plant and Wiring.

After the position and capacity of a required automatic exchange have been settled, and a particular system has been chosen for adoption, there still remain many intricate problems to be studied and solved before the details of exchange design and specification can be matured. Subscribers' lines have only a small amount of apparatus allotted to the individual service of each. The great bulk of the exchange switching equipment consists of apparatus provided for the common use of all subscribers; its quantity depends upon the volume of traffic to be carried, and not upon the number of lines.

There are many alternative ways in which the enormous number of selectable outlets involved may be grouped, and very careful calculation and planning are needed in order to arrive at the best economic layout and to insure that the amount of switching plant at all points in the system shall be adequate to the requirements of the traffic without wasteful overprovision anywhere. It is necessary to prepare data of anticipated traffic for all classes of calls, and the average probable duration of the calls, known as the "holding time," has also to be determined.

The amount of switching plant which will be simultaneously held in occupation during the busiest hour of the day depends on the product of "busy hour calls" and "holding time." This is expressed in what is known as "traffic units"—a term now standardized by the British Engineering Standards Association—in which holding time is reckoned in hours. Thus if each subscriber in a group of 100 makes, on the average, two calls during the busy hour, with an average duration of 3 minutes, the traffic originated will be (100x2x 3)/60=10 traffic units. In other words, a traffic unit represents the equivalent of one hour's occupation of a switching channel.

In most cases the switches engaged in providing a connection are engaged during its whole duration, and the calculated holding time for those switches includes the time to set up and to clear the connection in addition to the period of conversation. Several recent systems involve the use of auxiliary sets of switches which are temporarily employed as steering switches to control the setting up of a through connection, and are then released. The holding time in the case of these switches averages only a few seconds and a small number of sets can therefore handle a great many calls.

Another essential factor entering into the determination of the best economic layout is that known as "grade of service." Telephone traffic varies widely at different times of the day, and even the traffic of the "busy hour" shows considerable fluctuation from minute to minute. The provision of telephone plant in general is subject to the unfortunate economic condition that so far as the bulk of it is concerned, its periods of idleness must greatly exceed its periods of employment.

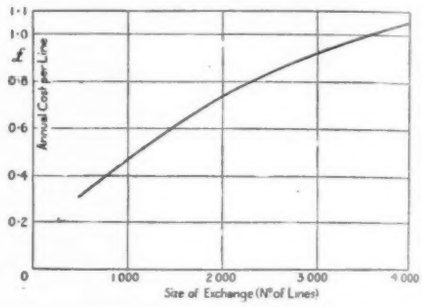


Fig. 8. Subscribers' Line Costs for Density Equal 1,500.

An endeavor to furnish an automatic exchange with switching facilities sufficient to ensure that exchange channels will be available for all calls at the peak of the busy-hour load in the busy season, would involve hopelessly uneconomic provision of expensive mechanism and would increase the cost of the service out of all proportion to the increase in its quality. It is, therefore, necessary to fix a limit for the number of calls which may fail to get through on account of insufficiency of switching plant. This number must be so small that, to the subscriber, it is inappreciable.

The proportion of calls that may be allowed to fail in this way in the busy hour represents the "grade of service" or "standard of service," and the Post Office has standardized a proportion of lost calls of 1 in 500 for each switching, with the proviso that if the traffic should increase temporarily by 10 per cent the grade of service shall not fall below 1 in 100.

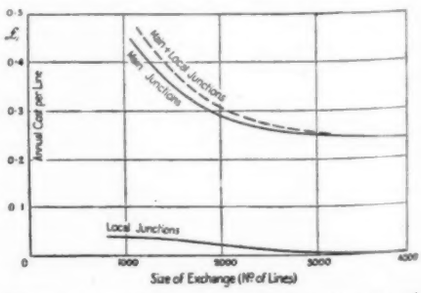


Fig. 9. Junction Costs for Density Equal 1,500.

There are also certain modifications to cover special circumstances.

Experience and observation have shown that the actual availability of switches, in groups carrying a given amount of traffic per hour, is closely in accord with the results obtained from a mathematical calculation of the probabilities, and, as is well known, the theory of probabilities is used, as far as it can usefully be applied, in the determination of the numbers of switches required. For example, if a group of subscribers originating a given amount of traffic can be given access to a group of selectors, in such a way that each subscriber can reach any of the selectors, the application of the theory in order to determine the resulting standard of service is trustworthy and comparatively simple.

Most of the problems encountered in large areas are, however, too complicated to be readily solved by theoretical means. In the case cited, each subscriber will, in practice, obtain access to the first rank of selectors by means of a pre-selector or line switch having a limited number of outlets, say, 24. The number of first selectors required in the exchange may, however, be 1,000 or more, and the problem will be to arrange the inter-trunking of line switches and selectors in such a way that, while each line can only reach 24 selectors, the traffic of the exchange will be carried, at the specified standard of service, by a minimum total number of selectors.

According to early automatic trunking practice the selectors would have been divided into independent groups of 24, and each group would have been multipled to as many line switches as it would suffice to serve during the busy hour. It has been found, however, that the average availability of selectors may be much increased by dealing with them in much larger groups, and by "grading" the multipled connections on the line switches in such a way that the 24 selectors to which each of them has access will be distributed throughout the larger group.

Fig. 11 illustrates the principle of grading applied to a group of 1,200 subscribers who require 128 first selectors to carry their originated traffic. Each subscriber is connected to a line switch having 24 outlets, and the outlets of 25 line switches are multipled together and terminated on a connecting rack. Any multiple of 25 subscribers may, therefore, be given access to one or more "individual" selectors, i.e., selectors to which that multiple, and no other, has access.

In the figure, 1,200 subscribers' line switches are connected to 128 first selectors. The grading has 16 groups, each group comprising 75 subscribers with access to 24 outlets. There is thus a total of 384 outlets to be graded down to 128 selectors, and the way in which this may be done is shown in the figure.

It will be seen that each group of 75

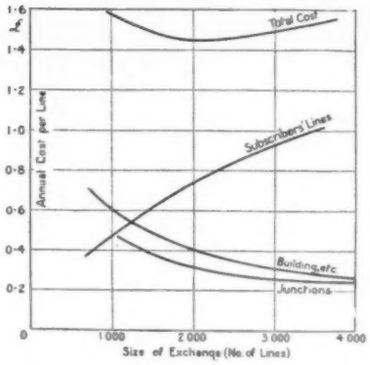


Fig. 10. Econoimcal Sizes of Exchanges for Density Equal to 1,500.

lines has individual access to 4 selectors via exchange trunks; that it shares 4 further selectors with one other group, 3 with 3 other groups and 7 with 7 other groups, while the remaining 6 selectors are at the common service of all the 16 groups into which the 1,200 subscribers have been divided.

Each 75 lines has, therefore, access, complete or partial, to 24 selector trunks, although its aggregate access, necessarily remain equivalent to 8 trunks as below:

Complete access to	4 trunks	= 4
Half access to	4 trunks	= 2
One-fourth access to	3 trunks	= 0.75
One-eighth access to	7 trunks	= 0.875
One-sixteenth access to	6 trunks	= 0.375
Mixed access to 24; aggregate access to 8		

It should be mentioned that, as the selector trunks which represent the first choice of the line switches are naturally kept more fully occupied than those later in the series, and as the selectors themselves are arranged in groups of 10 having a common multiple, it is necessary to calculate the probable traffic in each and to connect them to the grading tags in such an order that each group of 10 will carry the same amount of traffic.

Apart from any method of grading, the best arrangement of the plant—in this ratio of 1,200 subscribers to 128 selectors, which is equal to 8 selectors for 75 lines—would have been obtained by combining the 24 outlets of 225 subscribers' line switches in a common multiple with access to 24 selector trunks. Assuming normal busy-hour traffic, this would have provided a standard of service of 1 lost call in 100.

Grading in 16 groups, as shown, raises the standard of service to 1 in 500 without involving the use of any additional plant. In the absence of grading, this standard could only have been attained by reducing the number of subscribers' lines served by 24 trunks and selectors from 225 to about 190—equal to an increase of 15 per cent in the required number of trunks and selectors. The economy effected by grading is therefore an important one.

Another and older method of increasing the traffic capacity of first selectors is to provide access to them via an intermediate set of secondary line switches or "pre-selectors." Many descriptions of this method have appeared in automatic literature, and it is not necessary to describe it here. There is good reason for believing, however, that considering switching plant as a whole, the grading scheme effects substantially the same economy as the use of secondary line switches, while it has the great advantage of avoiding the circuit complications and the increased fault liability that the latter entails.

Problems similar to those mentioned arise in connection with the operation of hunting for disengaged trunking circuits between one rank of selectors and another. In this case, the economic importance of securing optimum trunking arrangements is greatly increased by the fact that the next rank of selectors may be located in another exchange and the circuits may have to traverse some miles of street cables.

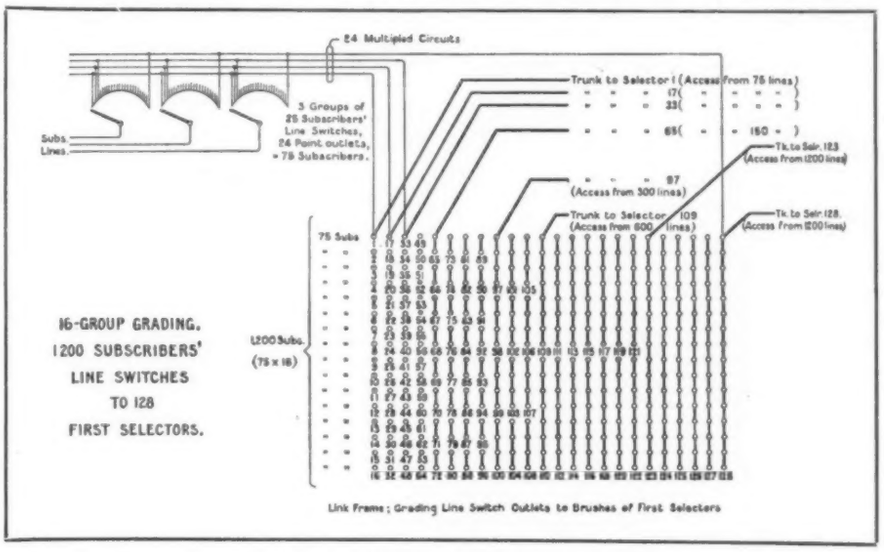

24 Multiplied Circuits
Trunk to Selector 1 (Access from 75 lines)
17(" " ")
33(" " ")
65(" 150 ")
Tk. to Selr. 123 (Access from 1200 lines)
97 (Access from 300 lines)
Trunk to Selector 109 (Access from 600 lines)
Tk. to Selr. 128 (Access from 1200 lines)
Subs. Lines.
3 Groups of 25 Subscribers' Line Switches, 24 Point outlets, = 75 Subscribers.
75 Subs
1200 Subs. (75 x 16)
16-GROUP GRADING, 1200 SUBSCRIBERS' LINE SWITCHES TO 128 FIRST SELECTORS.
Link Frame; Grading Line Switch Outlets to Brushes of First Selectors

Fig. 11. Diagram of Group Grading.

The increased traffic efficiency attending the selection of circuits in large groups has led to the design of selector switches which are capable of searching, or hunting, through much larger banks of trunking circuit contacts than the banks of 10 which are usually associated with the "step-by-step" automatic system.

The rotary system of the Western Electric Co. searches over a bank of 22 circuits, while the panel system of the same company is arranged to search a maximum of 90 circuits and could probably, if desired, be arranged to search nearly 500 circuits. The switches of Messrs. Ericsson's machine-driven automatic system could also, if necessary, be arranged to find a disengaged circuit in a group of approximately 500.

The direct step-by-step system is somewhat handicapped in this respect by the fact that the whole operation of searching for and finding a disengaged trunking circuit has necessarily to take place in the short interval between two successive pulls of the automatic signaling dial on the subscriber's telephone. In the case of machine-driven systems, such as those of the Western Electric Co. and Messrs. Ericsson, where the trains of signaling impulses are received from the subscriber by means of quick-acting "registers" which subsequently steer the call through the connecting switches, there is no such arbitrary time element to contend with.

It has, however, been possible to devise step-by-step switches which can search directly over a bank of 20 trunking contacts, two at a time, without exceeding the small time interval available. It is also quite practicable, on this system, to install suites of 10-contact or 25-contact "pre-selectors" between the varius ranks of switches, and thus raise the theoretical trunk hunting capacity to 100 circuits of 250 circuits.

Such pre-selectors installed, say, between second selectors and outgoing junction circuits, would have their brushes joined to the selector banks and their multiple banks connected to the junctions. The selector can only find an outlet to the junctions via a pre-selector, the brushes of which are already standing on an idle line. Thus the actual searching movement is confined to the selector itself, and the time required for the operation is not increased by the introduction of the intermediate pre-selectors.

Exhaustive study has shown, however, that by utilizing the methods of graded grouping already referred to, the need for large banks of trunk-hunting contacts, or their equivalent, can to a great extent be obviated, and that a satisfactory amount of traffic per switch can generally be carried even with 10 contacts in the bank level.

It appears possible that the savings so effected in switch construction, and by the omission of the intermediate pre-selectors, will in most cases balance the cost of the small proportion of additional junction circuits required for the 10-contact system, and selectors having banks of 10 contacts will therefore be used for ordinary services in the exchanges installed in London and throughout this country, unless and until further detailed study of local conditions indicates that facilities for increased searching range will at some points be economical.

It has been mentioned that the theoretical method of attacking problems of switching layout is often exceedingly difficult and leads to results which are tedious to evaluate. The most obvious alternative is to solve such problems by actual observations on working exchanges. There are two objections to this:

First that it is difficult to control such tests—i. e., it is necessary to work with the traffic actually experienced, whether this traffic is that required to give salient points on traffic curves or not—and secondly, that the available range of "grade of service" is very small, so that it is not possible to find what deterioration is effected in the service by a given increase of traffic or reduction in the number of switches. For these reasons it has been a practice of the engineering department to make use of "artificial traffic" for the production of designing curves, and the results obtained are checked by theoretical calculation and by observations at working exchanges, where possible.

Two methods of producing artificial traffic have been used, one employing numbered counters and the other making use of the numbers in a telephone directory. In the first method 100 counters, numbered "01" to "99," are placed in a bag and shaken. Counters are then drawn, one by one, at random, each counter being replaced after drawing.

The number of such drawings is made equal to the number of "busy-hour" calls required for the test, and the number drawn represents for that call the interval of 1/100th of an hour at which the call originates. By repeating the process and tabulating the results together, the time at which each supposed call originates may be determined to 1/10,000th of an hour. The times of the calls are arranged in sequence and are then available for the analysis of the effect of any desired grouping of switches.

The holding time may be constant or variable, as desired. In the telephone directory method, the time at which a call originates (to 1/10,000th of an hour) is obtained by choosing a succession of four digits from the numbers in the directory. In general, tens digits only are used, as with the others there would be a tendency for certain digits to occur more often than others.

Each of these methods is, of course, merely an attempt to obtain a sequence of events in time according to the laws of pure chance, and so to represent the entirely fortuitous intervals at which individual calls are made during a short period when the aggregate amount of traffic is fairly constant.

As an illustration of the way in which the fluctuations of traffic are proportionately reduced as the size of a group increases, it may be of interest to consider the case of a number of subscribers each making two calls per busy hour with a holding time of three minutes. If these are arranged in a group of 10 having a common outlet, the resulting traffic would be equivalent to one traffic unit, and, if the calls were made at absolutely uniform intervals, they would all be carried by a single switching channel, continuously occupied. Similarly, a group of 250 lines would originate 25 traffic units and require 25 switching channels under the same conditions.

Actually, if this provision were made, these percentages of calls would be lost:

	Per cent
For 10 lines (1 traffic unit and 1 switch) the loss would be	50
For 100 lines (10 traffic units and 10 switches) the loss would be	21.5
For 250 lines (25 traffic units and 25 switches) the loss would be	15
For 1,000 lines (100 traffic units and 100 switches) the loss would be	7.6

The matter may be looked at in another way as follows: Assuming that the standard grade of service of 1 in 500 is given, it is found that the average traffic per switch for the numbers of switches quoted above and in two graded cases would be:

10 switches will be asked to carry 3.43 traffic units per hour; average traffic units per switch	0.343
25 switches will be asked to carry 13.76 traffic units per hour; average traffic units per switch	0.55
100 switches will be asked to carry 76.4 traffic units per hour; average traffic units per switch	0.764
100 switches (10-contact grading), 43.6 traffic units per hour; average traffic units per switch	0.436
100 switches (25-contact grading), 64.08 traffic units per hour; average traffic units per switch	0.641

In the first three cases the pre-selectors finding their outlets via these switches are assumed to have a sufficient number of contacts to secure full availability; in the two last (graded) cases the pre-selectors would have only 10 and 25 contracts respectively. *(To be continued)*

Bowen Telephone Co. of Georgia Acquires Another Plant.

W. A. Moore, owner of the Nashville, (Ga.) Telephone Co., has sold his exchange of some 200 stations to the Bowen Telephone Co., of Fitzgerald, Ga. The Bowen company now owns and operates, in addition to the Fitzgerald exchange, the exchanges of Ocilla, Alapaha, Nashville, Alma, Abbeville, Rochelle and Rebecca.

Here and There in Telephone Work

Grounded Phantom Circuits for Short Distances Give Satisfaction.

By N. E. Branson,

Plant Superintendent, DeKalb County Telephone Co., Maysville, Mo.

While we are aware of the fact we get a very poor class of telephone service from the grounded phantom on long hauls, on lines not exceeding ten miles in length, and where we do not have high voltage lines paralleling the telephone lines, or other grounded telephone lines, they give very satisfactory service; in fact, they have a much higher transmission volume than the metallic from which they are taken.

Figs. 1 and 2 show how a three-pole, double-throw switch may be wired to some outlying exchange, mounted in a convenient place where the operator can reach it for making tests with the wire chief who may be located at the main exchange office.

Fig. 1 shows the circuits in normal condition as a metallic line and a grounded phantom taken off the metallic line. A 2 mf. condenser is connected in series with the ground of the phantom leading to the switchboard drop, being placed there in order that the wire chief may at any time make rough tests for possible grounds on the metallic line without the drop in the phantom interfering with the testing instruments. It also eliminates calling the distant operator to open the line for tests.

Fig. 2 shows the switch being thrown so that the metallic line will be short-circuited while the wire chief is making tests, and at the same time retains the phantom enabling him to recall the operator for other tests, or to restore the lines to normal position, thus avoiding tying the lines up, waiting for the operator to remember and restore the circuits. This gives the wire chief full control of the circuits at all times and does not place unnecessary obligations upon the operator.

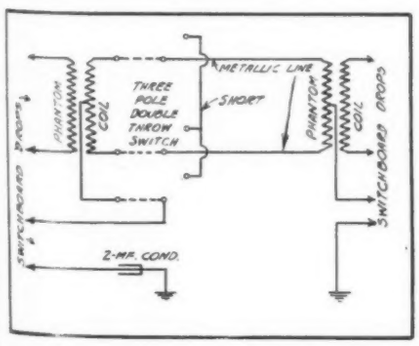


Fig. 1. Circuits in Normal Condition as Metallic Line and Grounded Phantom.

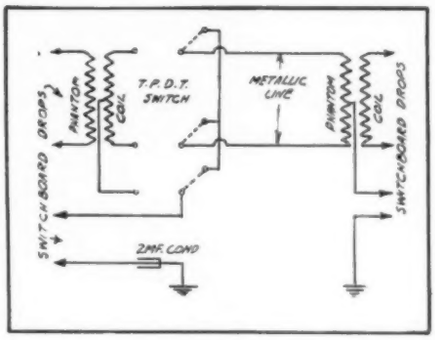


Fig. 2. Switch Thrown to Short-Circuit Metallic Line with Phantom in Service.

Fig. 3 is similar to Figs. 1 and 2 except a third wire is used instead of the ground return for the phantom.

We were using two No. 12 iron wires as a metallic, well-transposed, also a grounded line, as toll lines a distance of ten miles, when the installation of a 13,000-volt transmission line on the opposite side of the highway and paralleling the entire distance, put the grounded toll line out so far as transmission was concerned.

We installed two phantom coils at each end of the lines as shown by Fig. 3, and eliminated practically all the noise or disturbance. Although it may be seen at first sight that the phantom circuit was out of balance to begin with, because one side is made up with the two metallic wires in parallel, while the other side is a No. 12 iron wire, as is also the metallic, and while this kind of arrangement would not work on long lines, it does give very good satisfaction in this case, which is only a distance of ten miles.

Monthly Bulletin Showing City's Progress Will Help Company.

By Frank H. Williams.

The telephone company wants to attain, of course, the best possible relationship with the public it serves. How can it attain 100 per cent efficiency in this particular? How can the telephone company make its public feel enthusiastic about it and about its service?

Let's look into this matter a little carefully. The telephone company is, of course, the first concern to feel local depressions. It feels local depressions because the demand for new telephones slackens when there is depression.

Also, the company is the first local concern to feel the uplift of increased local prosperity. It knows when prosperity strikes the city, because the demand for telephones increases and the use of long distance service by local concerns increases greatly.

In these points there is a splendid chance for the telephone company to better its relationships with the public it serves.

The average normal American citizen is a home-lover and a home-town booster. He feels that his home town is the best sort of a place in which to live, and he is mighty eager for the town to show a fine progress. Also, of course, he is tremendously interested in all news that shows how the town is progressing. Right here, then, is the telephone company's chance.

The company can regularly issue bulletins, in the form of newspaper advertisements, showing from its records just how the town is progressing, and it can hook up with this same copy showing how alert it is to help the town along by giving new telephone service as quickly as possible and by bettering the service whenever possible.

Such bulletins could be issued once a month. In them the company could tell all of its activities during the month which have a distinct bearing on the progress of the city. This resume of the company's activities for the month might include information on such things as these:

Number of miles of new wire put up by the company during the month, with, perhaps, a map showing where new lines have been placed and where old wire has been replaced with new.

Number of new employes now working for the company over and above the number employed the previous month or employed a year ago.

Number of new instruments installed by the company during the month, with information as to where the telephones were placed, how many of them were in residences, how many were in offices, and how many were in factories and business establishments.

Number of telephones taken out during the month and the reasons why, to-

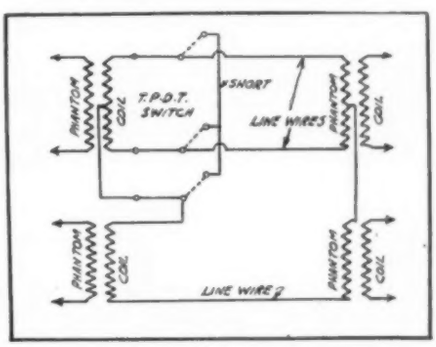


Fig. 3. Metallic Line Short-Circuited and Third Wire Used for Phantom.

gether with information showing the number of telephones now in use as compared with the number the previous month and the previous year.

Percentages of increase in the number of calls made by subscribers the present month as compared with the previous month and the previous year.

Approximate population of the city at the present time, judging by the number of telephones in use, as compared with the population the previous month and a year ago.

Prediction as to what the population of the city will be at the next census and in 1940, if the present ratio of population increase continues.

Fastest growing sections of the city, judging from the numbers of new telephones installed in different sections.

Average length of time being taken by the company in installing telephones, from the time the application is received until the instrument is ready for service. This could be compared with the similar time taken in previous years, and it could be shown that the company is giving speedier service in this particular than ever before.

Small number of complaints received by the company during the month, with a resume of the character of these complaints and the disposition made of the complaints.

Increased value of the company's local investment and information showing what a big percentage of the company's total receipts goes into the payment of wages and a permanent investment in improvements.

Number of miles covered by the company's trucks and service cars during the course of the month.

Number of local home-owners among the company's employes. This information could be used for the purpose of showing that the concern is a local institution and that the people working for the concern are all local people who are as much interested in the progress of the city as any other local folks.

Specific and definite improvements completed during the month in the company's exchange, in its accounting methods, in its handling of applications for new telephones, in its trouble-shooting, and in anything else connected with the operation of the business.

Number of times, during the course of the month, that the name of the city is presented to other cities by the use of the long distance lines of the company. In this connection it could be emphasized that every time a local person uses the long distance service of the company that individual is giving the home town some good advertising because the people who are called will think about the town and will feel that it must be a "live wire" city because of the fact that one of its citizens has used long distance in sending a message instead of writing.

And so on and so forth.

Of course, a single month's bulletin should not carry all this information. Only the more important things, along the lines indicated, should be given in any one bulletin. The things presented to the public in any one bulletin should be the things which show the greatest progress since the last bulletin on the part of the telephone company and on the part of the city.

In presenting each bulletin the company might say something like this:

"To Acquaint You With Your Home Town's Progress.

"This town is stepping right ahead all the time. Perhaps you don't realize the progress that is constantly being made here, but we, in your telephone company, do realize what is going on, and it is our purpose to acquaint you with the town's progress from month to month through this monthly bulletin.

We, all of us, want to see this town grow and increase in prosperity. We are all doing our bit at all times to aid in this growth, and here in the telephone company we are striving at all times to give speedier service in installing new telephones, and to give better service from every angle.

We know that you will be interested in the figures presented herewith. These figures are all authentic; they are compiled from our latest records. In giving you the population figures, we have used the figures in use by telephone companies in other parts of the country.

Look for this bulletin every month. Watch your city grow? And remember that our object in presenting this bulletin to you from month to month is to give you even greater service."

Many of the folks who read these bulletins would clip them up and mail them to friends and relatives in other cities. This, of itself, would be a splendid booster proposition for the town and the telephone company.

All this would be of splendid help to the telephone company in bettering its relationships with the public it serves. So use this sort of a proposition in your own town now.

HAVE AN AVOCATION.

Most of the great discoveries are the result of an avocation, a plaything during rest time.

The father of photography was an army officer; and of the electric motor, a bookbinder's clerk. The inventor of the telegraph was a portrait painter; and of the jacquard loom, a dressmaker. A farmer invented the typewriter; a poet, the sewing machine; a cabinet maker, the cotton gin; and a coal miner, the locomotive.

The telephone was the after-school work of a teacher of the deaf; the disc talking machine, the night work of a clothing salesman; the wax cylinder phonograph, of a lawyer's clerk; the type-setting machine, a grocery man. A physician made the first pneumatic tire because his little son was an invalid.

The story of nearly every great invention has been the result of some one's riding a hobby. Be skilled in your vocation, an expert, even a specialist if you like, but have an avocation.—Dearborn Independent.

Laying of Submarine Cable Across Galveston Bay Completed.

The Southwestern Bell Telephone Co. has just recently completed the difficult task of laying a submarine cable across Galveston Bay, at Galveston, Texas. Unusual difficulties were met and overcome in the laying of this cable, which is two and a half miles long, four and a half inches in diameter, and contains 54 pairs of 16-gage, double insulated wires. The cable was delivered in four reels, each reel weighing from 17 to 18 tons.

The first problem arose from the fact that the bay is shallow, never more than 16 to 18 feet in depth, and it was impossible to use a regular cable-laying boat. The shallow draft barge Lucy had to be used and towed along the trench while the cable was unreeled. A special steam barge, the Ajax, was secured to hoist the heavy reels onto the barge.

The next delay came when the Lucy sank June 9 during a squall on the bay. She had to be towed to shallow water and raised, and another barge was secured to replace her. Splicing of the cable was done under the supervision of F. J. Owsley, splicing foreman of the southeast Texas division. Extra precautions were taken against interruption of service from low insulation or leakage and damage, from ships' anchors.

The regulation splice was made, then a second lead sleeve was placed over the regular splicing sleeve, and the space between the two was filled with insulating compound. Finally the steel wires which protect the sheath of the cable and which had been pulled back to permit splicing were rewound over the sleeves, leaving the splices as strong as the remainder of the cable.

The cable towers at each side of the bay were completed early in July and the work remaining to be done—boring underneath railroad lines at Virginia Point to lay a conduit to carry the wires from the cable to the lines on the mainland—was completed before the end of the month.

The Search that Ends but One Way

A thousand signs that may mean everything or nothing, yet the search of the Northwest Mounted Police can end but one way. They never fail to accomplish their purpose.

And so with French Telephone Batteries. Their unfailing reliability has earned for them the respect and confidence of executives in the hundreds of telephone companies using French Telephone Batteries as standard equipment.

FRENCH BATTERY COMPANY
Madison Wisconsin

Atlanta Dallas Denver Kansas City Chicago New York Minneapolis

Also makers of French Ray-O-Vac Batteries.
Eleven models cover every radio use.

FRENCH
TELEPHONE BATTERIES

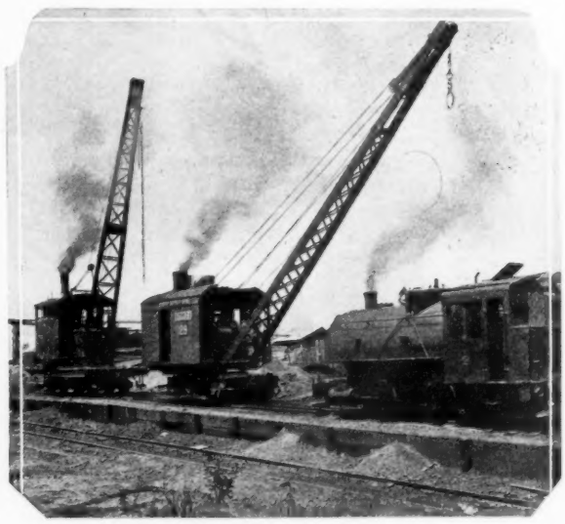
When writing to French Battery Co., please mention TELEPHONY.

With the Manufacturers and Jobbers

"Creo-Pine" Telephone Poles Give Satisfactory Service.

Southern yellow pine, properly selected and treated, makes durable telephone poles. It is one of the cheapest, most available and one of the most durable of the woods which are adapted to creosote preservative treatment. Pine poles are naturally straight and well proportioned and form a line of uniform and pleasing appearance. Poles treated by the Creo-pine process of the Southern Wood Preserving Co., of Atlanta, Ga., have long been the favorites of many telephone, telegraph and power companies because of their durability and low cost, giving service for 20 to 30 years, it is stated. One of the accompanying illustrations shows a line of Creo-pine poles which has been carrying a heavy load of telephone circuits for 18 years and is still in excellent condition.

Creosoted Pine Poles Carrying Heavy Load of Telephone Lines in Splendid State of Preservation, After 18 Years of Service.



Steam Equipment in the Company's Atlanta Plant, for Handling Poles and Other Timber Almost Entirely, Cuts Down Production Costs.

Creo-pine products are produced to meet the requirements as adopted by the American Wood Preservers' Association and large users of this type of material.

Poles and cross arms—as well as wood blocks and sub-flooring for textile mills—are treated by the Creo-pine empty cell process. By this process it is possible to obtain a very deep penetration at a small consumption of oil, and leaching or bleeding of oil is practically eliminated inasmuch as all excess oil is said to be removed.

If the timber has not been properly air-seasoned, it is loaded on tram cars or "buggies" and drawn into a large cylinder, six to eight feet in diameter and 100 feet long. The doors are closed and bolted and the wood is steamed for eight to ten hours at a temperature not to exceed 250 degrees Fahrenheit. Air is then pumped into the tanks until the air in the wood cells is compressed. Creosote oil is then admitted into the cylinder and the pressure increased to about 150 pounds per square inch, forcing the oil deeply into the wood.

When that has been accomplished, the pressure is released; the expansion of the compressed air within the cells expels the surplus creosote from the wood, this expulsion being aided by drawing a vacuum in the tank. Thus a deep penetration is obtained and at the same time no oil is wasted.

The preservation of wood by the empty-cell process requires the application of the utmost care and skill. Every step in the process of preserving Creo-pine products is minutely checked and inspected. Only sound Southern yellow pine, free from all defects detrimental to its strength or durability, is used.

The full process of creosote treatment is used by the Southern Wood Preserving Co. in the treatment of pilings, as a means of protection against marine borers, and in the treatment of street paving blocks, heavy bridge timbers and conduits.

The Southern Wood Preserving Co. has treating plants at East Point, Ga., and Chattanooga, Tenn. Its Chattanooga plant has been especially planned for the treatment of poles, cross ties and heavier timbers. Every possible manufacturing economy has been achieved in its design. The company's special facilities for obtaining high grade raw timbers at close-range hauls enables it to offer heavier Creo-pine products, and especially poles, at low costs.

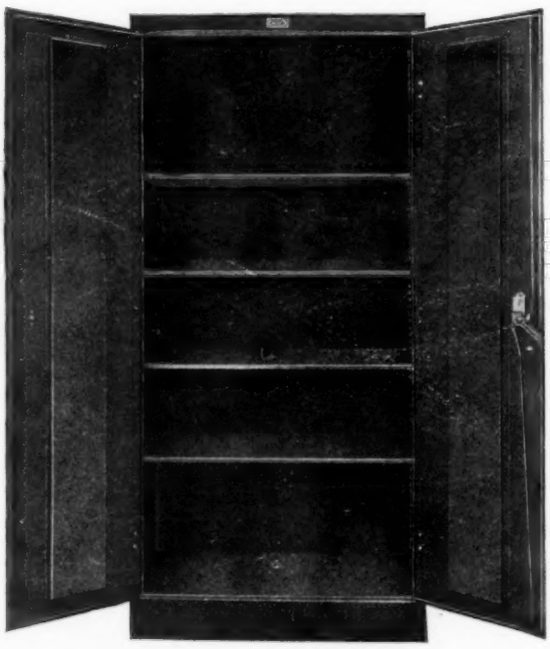
A handsome 32-page "Creo-Pine" booklet, recently issued by the company, tells of the need of wood preservation and describes in detail the processes of treatment it uses, giving complete standard specifications for interior creosoted wood block flooring for textile mills, telephone, telegraph, light and power poles, conduits and cross arms, bridge timbers, pilings and cross ties and the composition of the oils approved by the American Wood Preservers' Association and used in the treatment of all Creo-pine products.

Large Automatic Exchange "Cut Over" for British Admiralty.

On June 23, there was cut over at one of H. M. naval establishments in England, a Relay automatic branch exchange (P. A. B. X.) at present equipped for 550 lines. This exchange, which is the largest automatic installation in H. M. naval establishments, is interconnected with a 50-line Relay automatic exchange (P. A. X.) which was brought into service at a subsidiary establishment some weeks ago. The large P. A. B. X. has been installed in a newly-erected telephone building, and has replaced a six-position manual board. The manual board was originally a two-position board, which was installed in 1907, four positions being added at subsequent times. Eleven operators in three shifts and one supervisor were employed on this equipment.

The Relay P. A. B. X. is fitted with a two-position manual board, the subscribers' jacks being arranged in three panels. The operator, therefore, has ready access to any subscriber's jack. The manual board is used only for calls to the public exchange, and as such calls amount only to 1 per cent of the total traffic—the other 99 per cent be-

Lyon Storage Equipment Exactly Fits Your Needs



Tu-dor Cabinet

For the safe storage of costly instruments, stationery and other expensive materials. Doors have three point locking device. Four shelves—extra ones if desired—adjustable on one inch centers. Occupies floor space only 18 x 36 inches.

Telephone company storage needs—for stockroom, warehouse, office and exchange—have been studied intensively for many years by Lyon Engineers.

As a result, Lyon Equipment is designed to fit, with unusual exactness, the storage requirements of the industry. Exceptional construction features and a lasting baked enamel finish assure permanent satisfaction.

This specialized knowledge built into Lyon Steel Products has gained for them the preference of telephone companies from coast to coast.

Complete facts are in Lyon Telephone Equipment Bulletin 314, a copy of which will be sent you immediately on receipt of your request. In your storage problem, perhaps our experience may prove helpful.

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LYON METALLIC MANUFACTURING CO.

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PITTSBURGH	437 Smithfield St.	CHICAGO	230 E. Ohio St.
ROCHESTER	61 South Avenue	DETROIT	149-159 W. Fort St.
	NEW YORK	342 Madison Avenue	

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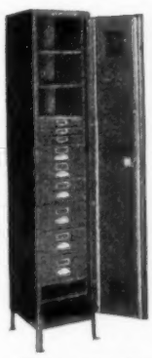


Wire Chief's Material Cabinet

Nine drawers and five shelves, occupying space only 15" x 15". Finished in green baked enamel. Three keys and master keyed.

Locker No. 854

In space only 36" x 20" this locker provides accommodations for seven persons, for coats, hats and private compartments with individual locks.

Li-flat Cabinet

For maps, tracings, blue prints, etc. Five sizes. Five drawers to a section. Standard green enamel finish.

Janitor's Cabinet

Two shelves, two bins, extra shelves if needed adjustable on 1½" centers, equipped for locking.

Wire Chief's Rack

Specially designed for storage of machine switching parts. Just over 9 feet long, 18 inches deep and 7 feet high. Has 102 drawers, adjustable shelves, cord hooks, full length double doors. Finished in green baked enamel.

ing dealt with entirely automatically by the "Relay"—it has been possible to give a much more efficient outside service, and at the same time dispense with nine of the operators necessary under the previous system.

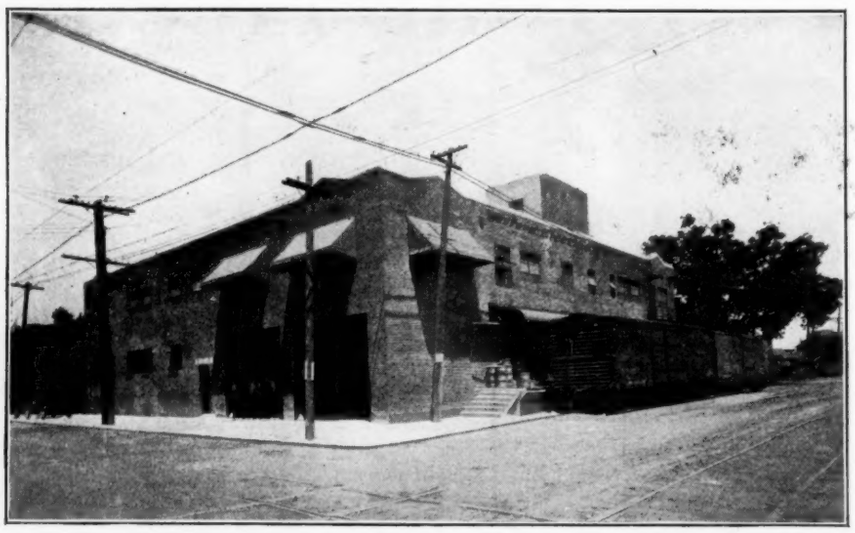
The commander-in-chief, and all establishments such as the engineers, central offices, workshops, main offices, barracks, cashiers, and police, are linked up in an entirely automatic service which effects its connections day or night in three seconds, while two very important distant stations are connected by the Relay switchboard, which also serves all vessels in the harbor. Some of these lines are three miles from the automatic exchange.

The 50-line subsidiary automatic exchange employs no operator whatsoever.

Facilities are provided on the large Relay exchange for any 16 officials to hold a conference, and three officials have preference or priority of service, while on the subsidiary exchange referred to three high officials have the same privilege.

The exchange is similar to the "Relay" equipment supplied to the British Post Office: Standard dialing tone, ringing tone, engaged or "busy-back" tones, are given. Provision is made on the large exchange for ten two-party lines with selective ringing. Alarms to indicate exchange faults are provided, and, according to the nature of the fault, either a delayed or instantaneous signal is given, depending upon the importance of the fault.

The 550-line Relay exchange is equipped with two sets of chloride batteries of 340 ampere hours' capacity and a voltage of 32, both exchanges, by-the-way, being of the latest 32-volt model. Two ringing machines are fitted on the 550-line exchange, one of which runs off the 220-volt main and the other off the exchange battery; the 50-line subsidiary exchange is also equipped with duplicate ringers.



This Distributing House, Recently Opened by the Western Electric Co., in Houston, Texas, Has a Floor Area of 20,000 Square Feet.

Rawlplugs, the Fiber Screw Anchor, Now "Made In U. S. A."

The Rawlplug Co. Inc., of 66 West Broadway, New York, announces the establishment of its own factory now in full operation in New York City. Heretofore Rawlsplugs have been made in England.

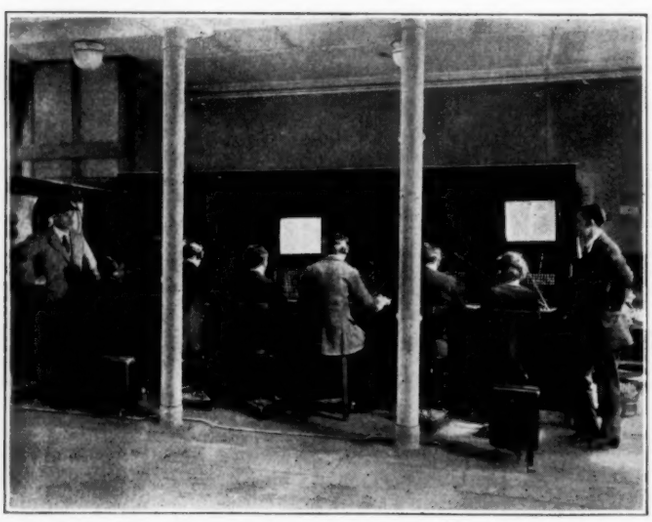
Due to the great distance between the maker and the market in this country, shortage of stocks in certain sizes was inevitable. This condition is now entirely eliminated. The great Rawlplug machines are now working at full speed in the New York plant turning out over 100,000 per day of those tough jute anchors that is declared to hold any screw fast in any material.

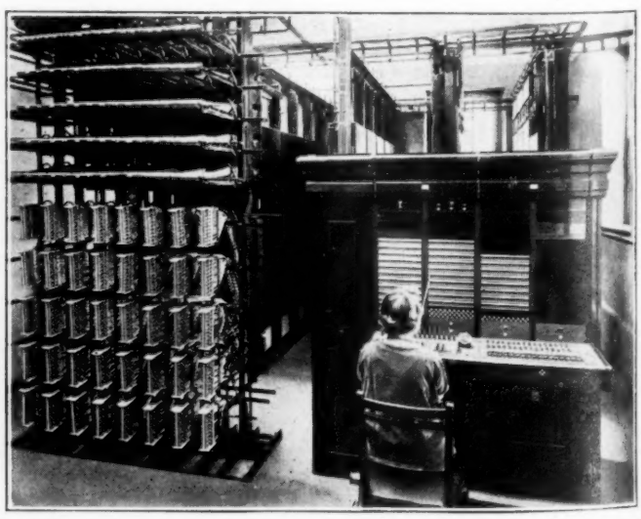
Carton of Rawlplug Jute Anchors Said to Hold Screw Fast in Any Material.

New cartons have been designed which are thoroughly in keeping with modern American packages. It is understood that an attractive stock-display case is soon to be offered retail dealers which will hold a complete stock of Rawlplugs and Rawldrills, as well as being an attractive, silent salesman for both products.

Prices in the Metal Markets.

New York, July 27.—Copper, quiet; electrolytic, spot and futures, 14⅜c asked.





Old Six-Position Manual Board and New 550-Line Relay P. A. B. X. Recently Installed to Replace It in One of the H. M. Naval Stations in England.

The telephone door

More people enter our homes and offices by telephone than in person. Through the telephone door, traveling by wire, comes a stream of people from the outside world on social and business missions. Important agreements or appointments are made, yet the callers remain but a few seconds or minutes and with a "good-bye" are gone. We go out through our telephone doors constantly to ask or give information, buy or sell things, make personal calls and on dozens of other errands.

None of the relations of life is more dependent upon co-operation and mutual consideration than these daily millions of telephone journeys. It is the telephone company's part to furnish the means of calling and to place courteous and intelligent employees at the service of the public. Good service is then assured when there is a full measure of co-operation between users.

Only by mutual care and consideration can everyone enjoy the full pleasures and benefits of calling. Telephone courtesy is for the good of all who use the telephone door.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES
BELL SYSTEM
One Policy, One System, Universal Service

Tin, easy; spot and nearby, 57.75c futures, 57.62c. Iron, steady; No. 1 northern $20 @20.50; No. 2 northern, $19.50@20; No. 2 southern, $18@19. Lead, steady; spot, $8.20@8.65. Zinc, firm; East St. Louis spot and futures, $7.27@7.30. Antimony, spot, 16.75@17c.

Northwestern Bell Report to Nebraska Commission for 1924.

The summary of the annual report of the Northwestern Bell Telephone Co. for 1924, covering the five states in which it operates, as published in TELEPHONY of July 4, page 34, contained some inaccuracies. The telephone operating revenue was reported to the Nebraska State Railway Commission as $24,111,725.64 instead of $24,111,796, as stated in the item in question.

Taxes assignable to operations were reported at $1,553,967.47. The ratio of dividends to stock during 1924 was 8 per cent, resulting in an increase of $843,000 in the total amount of dividends paid over the preceding year.

The total assets of the company were reported at $99,314,040.19 and the corporate surplus, $4,060,385.51. It has holdings in stock of the Lincoln Telephone & Telegraph Co. of the total par value of $3,885,000.

The ratio of operating expense to operating revenue was reported at 70.21 per cent by the Northwestern Bell company.

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

City Council of Prescott, Ark., Rejects Increase Petition.

The city council of Prescott, Ark., has denied the petition of the Southwest Arkansas Telephone Co. for an increase of 50 cents per month in telephone service charges. The present rates are $2 per month for residence telephones and $3 for business houses.

The telephone company filed its petition several months ago and the council held several hearings. The company contended that its plant is worth more than $40,000 and that its earnings are less than 7 per cent on its investment. The city council decided the value of the system is less than $30,000 and that the earnings are reasonable.

An ordinance was introduced fixing the rates the same as in the past. It is probable the telephone company will appeal to the circuit court.

Bond Sales, Prices and Wages, and Valuation Figures Discussed.

Another hearing on the application of the New York Telephone Co. for permission to increase its rates in New York City was held July 20 and 21 by the New York Public Service Commission. This hearing was in addition to the one being held by a special master appointed by the Federal court, which allowed a 10 per cent rate increase pending final decision. It was adjourned on July 21 until September 21.

Thomas Forde of Stone & Webster, appraisers, a witness, gave details of the telephone business and reviewed evidence given by him at previous hearings.

James F. Morrisey, an assistant corporation counsel, called attention to the fact that the company had no difficulty recently in disposing of a $50,000,000 bond issue and a $25,000,000 issue of preferred stock. The point was made to show that the company's earnings were sufficient to attract investors, and that the company could readily get all the money it needed. The city asked for a list of the cost of the company's newly constructed buildings and additions.

M. M. Fertig, for the city, objected to calling W. H. Blood, also an employe of Stone & Webster, because Mr. Blood had said that his last study of the company's finances was made 15 years ago, but Frankland Briggs, of counsel for the company, insisted that Mr. Blood was a competent witness because he was an expert in utility finances and because of his familiarity with gas and electric companies. Mr. Blood was allowed to testify, but presented no new facts.

Other witnesses were Halbert P. Gillette of Chicago; Frank E. Larned, another employe of Stone & Webster; and Jesse E. Moir, a statistician employed by the company.

Mr. Gillette said that a fundamental factor in finance is that the per capita money circulation in the country is from $10 to $11. He said that he had inspected 151 utilities in the last ten months and that wage levels had risen slightly during the last three years. There was no sign of a reduction, he said, but efficiency in production had improved on account of new inventions and better machinery. The laborer now worked only eight hours a day, he said, where before he averaged 11 hours.

He said he thought that large investments in real estate and stocks was an indication that the bottom will not drop out of the market and that the people feel that top prices will prevail for two or three years more.

Mr. Gillette's testimony was brought out to show that there would be no decline in production costs and that the application of the company for an increased rate was reasonable.

George W. Whitemore, the company's valuation engineer, testified that it would cost $373,293,000 to reconstruct the New York City system. His estimate, he explained, was based on the prices of June, 1924. The testimony was given because the law requires that the cost of reconstructing the system must be found in order to find a base for a proper profit.

One of the items in the estimate provided for $350,000 for legal exepnses and Assistant Corporation Counsel Joseph P. Morrisey admitted that this figure was reasonable.

H. A. Trax, chief accountant of the company, submitted reports to show that the company earned only 1.63 per cent of the reproduction cost of its property. Figures in 1924 show that the revenues for that year were $119,528,099, of which $88,826,116 was earned in this city and $30,701,982 up-state. Expenses for the year, it was stated, totaled $105,977,090. The net earnings, therefore, were $13,551,099.

Local Company to Take Over Bell Plant at Blair, Neb.

The Blair Telephone Co. has applied to the Nebraska State Railway Commission for authority to retire and cancel all of its outstanding stock, totaling 241 shares and representing $10,800. It also desires authority to issue instead 964 shares for a total of $37,400.

This step is taken preparatory to clearing the way for taking over the exchange property in Blair of the Northwestern Bell company, which has operated a rival exchange for years. The local company will use part of its cash surplus to pay for the property taken over. This will leave Red Cloud as the only other town of any size in the state with dual telephone service, and there negotiations are in progress for the Lincoln company to retire and let the farmers' company have the field.

The Blair company was started with an authorized capital of $20,000, but for a number of years has no more than $8,560 outstanding. It paid no dividends, but put all its net earnings into plant, and when this was not sufficient it assessed the stockholders. The result is that it now

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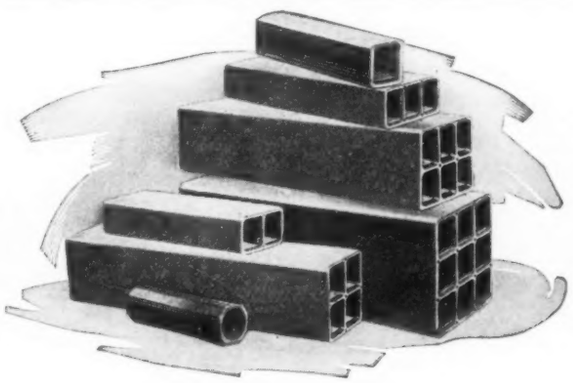

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Pacific Company Ordered to Establish New Exchange.

The California Railroad Commission, on July 20, ordered the Pacific Telephone & Telegraph Co. to establish a telephone exchange to serve the communities of Montrose, Verdugo City, La Crescenta and adjacent territory, construction to commence on or before August 15 and exchange and toll service to be furnished in that exchange on and after January 1, 1926. On and after that date the company is authorized to discontinue Glendale service within the new exchange area.

The rates proposed to be put into effect by the telephone company were not accepted by the commission, the order of the commission establishing the schedule to be collected fixed rates in nearly every instance lower than the proposed schedule. The charge for completed calls between Montrose, Verdugo City and La Crescenta and Glendale will be five cents; to Pasadena, 10 cents.

"Borrowed" Telephone Service Up Before Nebraska Commission.

M. D. Young, president of the Republican Valley Telephone Co., of Franklin, has asked the Nebraska State Railway Commission for a ruling as to whether traveling solicitors for women's magazines can impose on the local telephone companies.

He says that five of them have been operating recently in his territory. They go into a merchant's store and make a deal with him whereby, for the loan of his telephone with which to call up women and solicit their subscriptions, they give him a part of their profits.

Recently when Mr. Young tried to collect five cents a call from one of these women, she grew very indignant, declared that she was an employe of the merchant and that the company was obligated to furnish him all of the service that his business required. Mr. Young says he doesn't believe that is correct, and he asks for authority to insist on payment of the local call charge to non-residents.

Des Moines, Iowa, Residence Rates Increased As of August 1.

An advance in residence telephone rates for Des Moines, Iowa, was announced recently by Russell J. Hopley, district commercial manager of the Northwestern Bell Telephone Co., effective as of August 1.

Individual residence telephones will now cost $3.50 per month, an increase of 50 cents, and two-party residence telephones, $2.50, an increase of 25 cents. Residence wall extensions will cost 75 cents per month and desk extensions, $1, an increase of 25 cents.

"This adjustment in telephone rates is the first our company has made in Des Moines in 20 years," said Mr. Hopley. "With the growth of the city, naturally it is necessary to add more equipment and to increase our personnel, and in consequence the rates must be advanced to meet these added costs.

"The Northwestern company plans within the next few years to add equipment costing approximately $3,000,000 in order to cope with the growth of the city," Mr. Hopley said.

Given Increased Rates; Chamber of Commerce Endorses Increase.

With a resolution of the Neligh, Neb., chamber of commerce in his possession, recommending that the Northwestern Telephone Co. of that city be given an increase of 50 cents on business telephones and 35 cents on residence. O. A. Williams, manager, had no difficulty in convincing the state railway commission that he was entitled to more revenue. An order granting his request, with a few changes, was issued.

In the rates proposed, Mr. Williams arranged for only a differential of 15 cents a month between individual and two-party residence service. The prevailing differential in Nebraska is 25 cents, and the commission said this should be maintained in this case. It authorized these rates: Business service, $3.25 a month; individual residence, $1.85, and two-party residence, $1.60. Mr. Williams wanted $1.70 for the latter, which is a new service offered. These are gross rates, subject to the usual 25 cents a month discount for advance payment.

In 1920 the company authorized an increase in the company rates, and fixed the depreciated value at $19,718. At the present time the company shows total assets of $29,692. It has $10,000 common stock outstanding, notes payable of $8,000 and bills payable of $1,526. The indebtedness has accumulated since 1917 and for the large part the proceeds went into the operation and maintenance of the plant.

Up to and including 1920 dividends at 8 per cent and over were paid. These were cut 6 per cent the next two years, but only partly paid. The balance was represented in notes to stockholders. Since then no dividends have been paid, and all officers, save a bookkeeper at $165 for the period, were cut off the salary list. The gross income in 1924 was $9,759.54.. Operating expenses were $8,122.32, taxes $300, interest $660, and dividends $800, leaving a deficit of $122.78.

As there was only stock outstanding of less than half the value of the property, as found in 1920, and as no officers were paid, the commission finds added revenues to be necessary. These same facts were presented to the chamber of commerce, and it passed the resolution recommending the increases in view of recent improvements in the service.

A rather unusual traffic condition exists at Neligh. The company, with only 638 subscribers directly connected with the exchange, employs six full-time operators and pays one-half the salary of the night operator. The Northwestern Bell operates the toll switchboard in the central office and maintains two full-time operators and pays half the salary of the night operators. This means that nine full-time operators are employed. The exchange is connected with five other exchanges operated by the Northern Antelope company of Neligh so that altogether nearly 1,000 are served. This causes the big traffic conditions.

The commission says that many companies in the state with exchanges of 500 subscribers employ not to exceed three operators who handle toll as well. Both companies have common stockholders and a very close relationship exists between them. Northern Antelope subscribers, switched at Neligh, pay that company $1.50 a month and in turn that company pays the Northwestern of Neligh 25 cents.

The commission says this is entirely too low, but it will not disturb the condition because of the precarious financial situation of the Northern Antelope. The business men desire all these connections with the outside, and so backed the request.

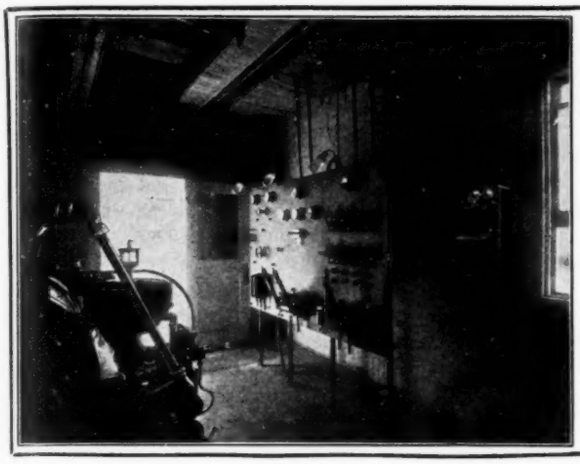
The commission estimates that the new rates will increase gross revenues $1,902, which it finds is not excessive and to be necessary to maintain service and pay dividends. The rates became effective August 1.

Valuation of Telephone Property for Rate-making Purposes.

Valuation of the property of a telephone company for rate-making purposes must be in terms of present prices and present money.—New York Telephone Co. vs. Prendergast et al.; U. S. District Court, New York; 300 Federal 822.

Fixing of Rates by Public Utilities Commission.

In telephone company's suit, under Judicial Code, section 266 (Comp. St. section 1243), to enjoin enforcement of order of Public Utilities Commission of Ohio, fixing alleged confiscatory rates, under Gen. Code Ohio, section 614—32, the district court will not review the commission's valuation of the company's property, but will merely determine whether the valu-



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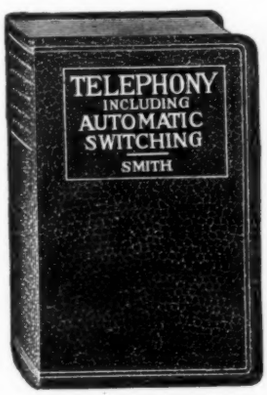

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ation and rates fixed by the commission are confiscatory, and, if they are confiscatory, it is for the commission, and not the court, to make the correction.—Ohio Bell Telephone Co. vs. Public Utilities Commission of Ohio et al.; U. S. District Court, Ohio; 3 Fed. (2d) 701.

First Hearings Held in New Hampshire Telephone Rate Case.

Hearings were commenced before the New Hampshire Public Service Commission on July 14 on the application of the New England Telephone & Telegraph Co. for an increase in rates in that state averaging 17.7 per cent above the present rates. George R. Grant, attorney for the telephone company, declared the New England Bell never has earned a fair return on its investment in New Hampshire.

The value of the company's property in the state was given as $12,995,065 by the company's chief engineer and as $12,770,984 by W. F. Sloan, consulting engineer, employed by the company for the purpose of making an appraisal of its property.

President Matt B. Jones testified to the effect that New Hampshire has never paid an adequate rate for its telephone service, based on the investment in the state.

Mr. Jones stated that his company plans to spend approximately $5,750,000 in construction in the next five years, out of a total of $100,000,000 to be expended in the entire system. He said that New Hampshire's share of $11,900,000 additional revenue expected from the proposed rate increase is $490,000 annually, an increase of about 17.7 per cent, as against an increase of 21.3 per cent for Massachusetts and 20.5 per cent for Vermont.

New York Town Seeks to Retain Free Municipal Service.

Officials of South Nyack, N. Y., have engaged Frank Comesky, a Rockland County attorney, to fight a recent order of the New York Telephone Co. to compel the village to pay for municipal telephones, which were to be free according to a franchise granted in 1895.

South Nyack received contracts the middle of last month calling for a monthly payment of $6 for two telephones. The regular rate in the village is $3, but the telephone company agreed to give the village a 25 per cent discount on all service. The failure to sign these contracts by August 1 would mean the termination of service in both the South Nyack police and fire headquarters, a letter stated. The telephone company asserts that the franchise of 1895 was annulled by a resolution adopted in 1902 which failed to mention free service.

New Rates Approved for Wittenberg (Wis.) Telephone Co.

The Wittenberg Telephone Co., serving some 450 subscribers at Wittenberg, Elderon and Eland and vicinities, was authorized by the Wisconsin Railroad Commission on July 17 to increase its rates for individual and two-party line local business and residence service 50 cents per month and its rural business and rural residence rates 25 cents per month. A new classification of four-party residence service, at $1.50 per month, is added to the company's schedule.

The new schedule of monthly gross and net rates follows:

	Gross.	Net.
Business, one-party....	$2.75	$2.50
Business, two-party ..	2.50	2.25
Business, extension		1.00
Residence, one-party...	2.25	2.00
Residence, two-party...	2.00	1.75
Residence, four-party..	1.75	1.50
Residence, extension....		.75
Rural, residence	**1.75**	**1.50**
Rural, business	2.00	1.75
Extension bells		.25
Extension bells located out of doors or in open sheds		.50

The above residence and rural rates are applicable for wall sets only. Desk sets for residence service will be charged for at a rate 15 cents in excess of the wall set rates.

The commission accepted the company's book value as of December 31, 1924, $21,379, as a conservative estimate of the physical value of the property. The company's operations in 1924 resulted in a deficit of $112. The commission, after considering the evidence in this proceeding, was of the opinion that rates which will produce approximately $10,000 of revenues per year, are required to yield a fair return.

It thereupon modified the rate schedule of the applicant to produce the required revenues.

Commission Approves Toll Rates for Lebanon-Watertown Circuit.

The Wisconsin Railroad Commission, on July 17, authorized the Lebanon Telephone Co. to establish toll rates of 10 cents for five-minute messages, on station-to-station calls, with five cents for each additional five minutes of overtime and 15 cents for three-minute person-to-person calls with five cents for each one minute of overtime for all messages transmitted between its Clyman and Lebanon exchanges and the exchange of the Wisconsin Telephone Co. at Watertown over the toll line of the Lebanon company.

As heretofore the Wisconsin company is to receive three cents as a switching charge for each message, all revenues in excess thereof to go to the Lebanon Telephone Co.

It was brought out at the hearing in this proceeding that the applicant has an investment of $1,600 in its Lebanon-Watertown toll line and that the line is now in need of general rebuilding in order that adequate service be maintained. It was further brought out that the Wisconsin Telephone Co. had agreed to continue furnishing switching service over this line at Watertown at the rate of three cents per call.

The company's annual report for 1924 showed a net of $1,300 for depreciation and return, which was $700 less than the commission's estimate of its requirements. The commission estimated that the application of the proposed toll rates would increase the company's revenues by about $475.

Notwithstanding the publicity given the proposed toll rates, no protests had been entered at the hearing. In view of these facts the commission found that the toll rates applied for are necessary and may properly be authorized. It thereupon ordered them placed in effect as of August 1.

Summary of Commission Rulings and Schedule of Hearings.

INTERSTATE COMMERCE COMMISSION, WASHINGTON, D. C.

July 30: Hearing in the matter of the application of the New York Telephone Co. and the Erie-Wyoming Telephone Co. for a certificate that the acquisition by the former company of control of the latter by purchase of capital stock will be of advantage to the persons to whom service is to be rendered and in the public interest.

CALIFORNIA.

July 20: The commission ordered the Pacific Telephone & Telegraph Co. to establish an exchange to serve the communities of Montrose, Verdugo City, La Crescenta and adjacent territory, construction to commence on or before August 15 and service to be furnished by January 1, 1926. These communities are now being furnished by the Glendale exchange.

CONNECTICUT.

July 2: The commission authorized the Connecticut Valley Telephone Co. to issue 1,412 shares of its capital stock of the par value of $25 per share, to be sold for cash, the proceeds to reimburse its treasury for expenditures already made and to be made and for the refunding of outstanding indebtedness incurred for the construction, completion and extension of its plant.

ILLINOIS.

July 31: Hearing at Bloomington in the matter of proposed advance in rates for telephone service in Downs and vicinity, McLean county, as stated in rate schedule No. 2 of the Downs Telephone Exchange. No. 14892.

August 4: Hearing at Minier in the matter of application of the Minier Mutual Telephone Co. for order authorizing the issue of bonds in the sum of $25,000 and the execution of a deed of trust to M. A. Gifford, trustee; also for order authorizing increase of 25 cents per month in rates at Mackinaw, Minier and Stanford. No. 14734.

KANSAS.

July 13: Increases in rates of 50 cents a month on business, residence and rural party lines granted the Farmers' Mutual Telephone Co. of Whiting. Individual business telephones will pay $2.50 a month, and individual residence and rural party lines $1.50 a month each.

MAINE.

August 4: Hearing at Augusta on the complaint of Frank O. Reed and other residents of the towns of China and Windsor against the China Telephone Co., alleging inadequate service.

MINNESOTA.

August 4: Hearing at Clara City in the matter of the application of the Clara City

Telephone Co., for authority to change its schedule of telephone rates at Clara City, Minn. M-1512.

MISSOURI.

July 21: The commission authorized F. W. Wessel, B. J. Bursmeyer and C. F. Bursmeyer to purchase the Ozark Telephone System for the sum of $5,000 from Victor T. Moberly. No. 4418.

NEBRASKA.

July 22: Application of the Blair Telephone Co. for permission to cancel existing stock and make new issue of $37,400 filed.

July 23: Request filed by Republican Valley Telephone Co. for ruling as to right of merchants to give traveling magazine solicitors free use of service in consideration of a percentage of profits.

July 24: Answer filed by Farmers & Merchants Telephone Co. of Alma to request of Orleans Community club for Sunday service, challenging right of commission to order unnecessary work on Sunday as in contravention of law, and asking for increase in rates if petition is granted.

NEW HAMPSHIRE.

July 14: Hearing on proposed increase in rates by New England Telephone & Telegraph Co. opened.

NEW YORK.

July 20-21: Hearing held in New York City on application of New York Telephone Co. for increased rates. Testimony taken regarding costs, prices and valuation of the company's property in New York City. Hearing adjourned until September 21.

OHIO.

July 21: The commission approved, in a modified form, the proposed reorganization of the Jefferson & Warren Telephone Co., of Orangeville.

On application of this company to sell all of its assets and $25,000 in cash to the Northeast Ohio Telephone Co. for $270,000 in stocks, an order was entered authorizing the purchase by Northeast Ohio company of the physical property, except a working capital of the Jefferson & Warren Telephone Co., subject to $14,700 bonded indebtedness for $165,500.

The Northeast Ohio Telephone Co., on an application to issue in payment for property as applied for $185,000 common stock and $85,000 6 per cent preferred stocks, was authorized to issue in payment for the property as authorized and for the sum of $26,000 in cash, $14,700 of which is to be used to pay indebtedness assumed and $10,300 to be used as a working capital, $106,300 common stock, and $85,000 preferred stock.

July 23: Application looking to the reorganization of the Tuscarawas County Telephone Co., with exchanges at New Philadelphia, Dover and Mineral City was filed as follows:

The Tuscarawas County company asks authority (a) to sell all of its property, subject to $286,000 first mortgage bonds, which mature February 1, 1926, to the newly-organized Ohio Cities Telephone Co. for $58,000 preferred stock to pay for the equity in the property (b) to issue and sell at $1 per share, 15,000 shares of no par common stock, at par, subject to 15 per cent commission, $150,000 additional preferred stock and payment of the assumed bonds and provide $386,000 net additions to plant, and (c) to issue sufficient additional stock to convert the bonds up to 1929 on a basis of 110 for 100, and after 1929 on a basis of par for par. Property values and estimates will be checked.

July 23: The Ohio Bell Telephone Co.

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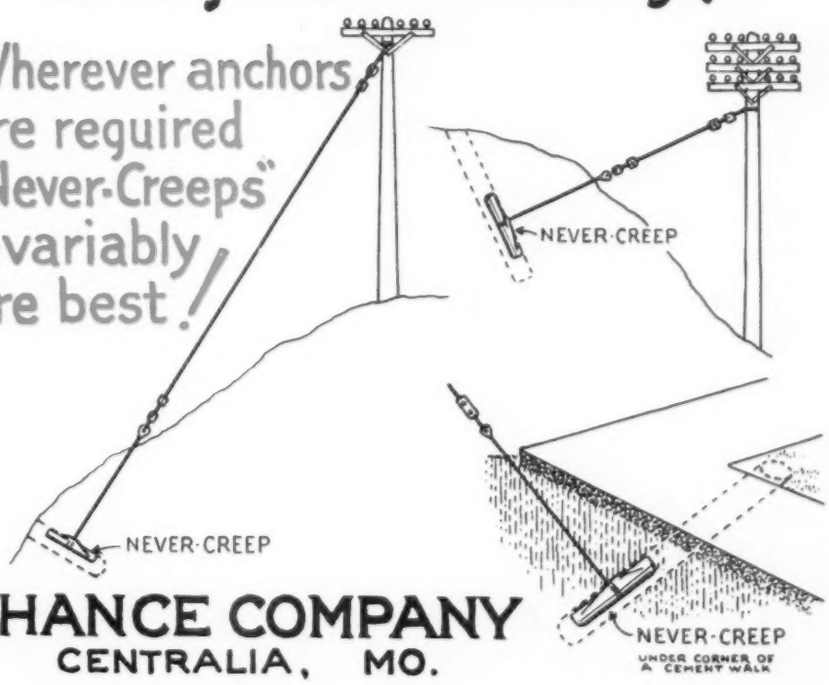

CHANCE COMPANY
CENTRALIA, MO.

filed application for authority to sell its outside plant and some toll property in and about the village of Trimble, Athens county, to the Union Telephone Co., of Glouster. The consideration was not disclosed.

July 23: The Athens County Home Telephone Co. was authorized to sell at par $12,400 6 per cent preferred stock, the proceeds to be applied toward the reimbursement of its treasury for $30,018 uncapitalized capital expenditures to March 31, 1925.

June 23: The Ohio Bell Telephone Co. elected to put its suspended increased rates at Osborn and Canfield in effect at the expiration of the suspension period. It stated that the new rates will increase annual revenues at Osborn $445 and asked its bond be fixed at $300. On a showing of an annual increase of $2,460 at Canfield, the company asked that bond in that area be fixed at $1,300.

OKLAHOMA.

August 5: Hearing in the case of the Southwestern Bell Telephone Co. vs. the Kiowa Telephone Co., alleging violation of the commission's order. No. 912.

VIRGINIA.

September 30: Hearing in re-application of the Chesapeake & Potomac Telephone Co. for an increase in rates throughout the state. The company asked that the rates be made effective August 1 but the commission has suspended the new schedules pending hearing and investigation as to their reasonableness.

WISCONSIN.

July 18: The commission ordered the Quincy Telephone Co. to refrain from making its proposed extension into the unincorporated village of White Creek to serve the residence of O. H. Dunn, finding that Mr. Dunn is in position to secure reasonably adequate service at reasonable rates from the Adams County Metallic Telephone Co. which already has a telephone line in front of his premises. It appeared that his sole reason for desiring service from the Quincy company was to secure the somewhat low rate applied by it. T-1161.

July 17: In the matter of the application of the Pulaski Merchants & Farmers Telephone Co. to establish a rate of $1 per month for extension telephones—this rate having been unlawfully charged to certain customers by the commission—ordered that this rate be discontinued forthwith and the following monthly rates placed in effect:

Complete extension service—
Business subscribers..75 cents per month
Residence subscribers.60 cents per month
Answering extension service—
Business subscribers...60 cents per month
Residence subscribers.50 cents per month

V-3222

July 17: The commission authorized the Lebanon Telephone Co. to establish standard toll charges for messages between its Clayman and Lebanon exchanges and the exchange of the Wisconsin Telephone Co. at Watertown. The Wisconsin company is to receive three cents for each message switched over this line—which is owned by the Lebanon company—and the Lebanon company is to receive all revenues in excess of that amount. U-3204.

July 17: The commission approved a new rate schedule for the Wittenberg Telephone Co., of Wittenberg, Elderon and Eland, which, it is estimated, will yield annual revenues of about $10,000. The schedule asked by the company was estimated to yield a total income of $11,432. U-3213.

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